FOOD AND NUTRITION TECHNICAL ASSISTANCE

A Study of Emergency Relief Foods for Refugees and Displaced Persons

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LIST OF ACRONYMS

ACF	Action Contre Faim
BHR	Bureau for Humanitarian Response (USAID)
BP5	Compact food bar produced by COMPACT, Norway
BP100	Compact food bar based on F100 formula
CSB	Corn Soy Blend
EFP	Emergency Food Product
F 100	Medical food designed for use during rehabilitation phase of treating severely malnourished adults and children
GBG	Golden, Briend and Grellety recommendations
HDR	Humanitarian Daily Ration
HEB	High Energy Biscuit
IDP	Internally Displaced Person
IRC	International Rescue Committee
MRE	Meals Ready to Eat
OFDA	Office of Foreign Disaster Assistance (OFDA)
RDA	Recommended Daily Allowance
RDI	Recommended Daily Intake
RUTF	Ready to Use Therapeutic Food
TFC	Therapeutic Feeding Center
WFP	World Food Program

STATEMENT OF PURPOSE

The United States Agency for International Development (USAID) Bureau for Humanitarian Response (BHR) is seeking to develop specifications for an emergency ration that is appropriate nutritionally, culturally and logistically convenient for delivery to uprooted and disaster affected populations in the first stages of an emergency. The ration is envisaged as a nutrient dense, stand-alone ready to eat food. There are currently no authoritative specifications for a food to meet the needs of these populations.

A committee of the National Academy of Sciences (NAS) agreed to determine the specifications for the EFP. In order to assist the Committee in this task, USAID requested the Food and Nutrition Technical Assistance Project (FANTA) to prepare two papers on background information for the committee. This paper draws on existing theory, current guidelines and anecdotal evidence from the field in order to discuss and summarize current thinking and practice regarding compact foods. The Committee will recommend specifications for an Emergency Food Product (EFP) that would be appropriate for and acceptable to uprooted people in emergency situations that satisfies all of their nutrient requirements for a period of up to 15 days. The target group is people of all age groups over 6 months of age and from any religious background, who have little or no adequate food from local sources nor access to conventional food aid commodities. EFP specifications should consider:

- Cost effectiveness
- Nutritional composition
- Food properties
- Packaging and configuration
- Cultural acceptability
- Labeling

The purpose of this paper is to provide the Committee with information on the nutritional requirements of the target population and the constraints associated with meeting the theoretical requirements. It provides product descriptions and comparisons of compact rations currently in use. This paper draws upon existing theory, current guidelines and anecdotal evidence from field practitioners and emergency experts in order to discuss and summarize current thinking and practice regarding compact foods. It is intended as a background discussion paper. An additional paper by Michael Golden further explores and details the recommended macro and micronutrient content of the EFP and discusses nutrient density recommendations.

This paper seeks to briefly examine several issues under the following broad headings. Key points are highlighted throughout the text:

- Introduction
- Use of compact foods
- Theoretical requirements and basic principles
- Factors for consideration in the design of the EFP
- Summary of conclusions
- Key recommendations

EXECUTIVE SUMMARY

In response to the escalating scale and number of humanitarian emergencies, the United States Agency for International Development (USAID) Bureau for Humanitarian Response (BHR) is seeking to develop specifications for an Emergency Food Product (EFP). The EFP must be appropriate nutritionally and culturally and logistically convenient for delivery to affected populations in the initial stages of an emergency. The ration is envisaged as a compact, nutrient dense ready-to-eat food that would satisfy the nutrient requirements of the recipient population for up to 15 days. The target population is people of all age groups over six months and from any ethnic background, who have little or no adequate food from local sources nor access to conventional food aid commodities.

Currently USAID procures compact rations with scarce dollar resources from producers outside of the United States because as yet there is no appropriate compact ration produced for this purpose in the country. Emergency rations from non-U.S. sources cannot be procured with the P.L.480 Title II food aid budget. Thus USAID has identified the need for a compact ration that would be suitable for uprooted people in the initial stages of an emergency for short periods of time. Additional uses may include other situations where people have little access to food, cooking fuel, and water, such as a sedentary population cut off by conflict.

There are several key advantages of compact foods that make them useful in emergency situations:

- Compact foods require no preparation
- A long shelf life allows compact to be pre-positioned
- Compact foods have a high energy/nutrient density to volume ratio
- Compact foods are easy to handle, transport and distribute

There are also disadvantages which must be taken into account. The disadvantages include primarily high cost, wastage and the risk of diversion. In recent years there has been a mushrooming of compact food products for use in emergencies. This reflects both the growing number of emergencies and the increased need for readily available products that can be easily transported and used immediately. Despite the growing number of products, there is little information on the use of compact foods in the standard emergency guidelines. Very few formal reviews exist. As a result, the use of compact foods in emergencies has produced mixed results.

Conclusions

- There is a critical niche for compact foods during the initial stage of a crisis, particularly when people are on the move (period of flight and/or returning home). They can be very useful as a stop gap ration before the food basket is established, where populations have very little access to water and cooking fuel, and may be particularly useful in insecure areas.

- If compact foods are used as a “stop gap” ration during the initial stages of a crisis, it is critical that they can be delivered on a timely basis, that is within 48 hours.

- Anecdotal evidence and field experience suggest that a planning period for EFP consumption of up to 15 days is reasonable.

- Despite the fact the planning figure of 2100kcal is widely accepted, there is still some discrepancy regarding the minimum daily energy requirements for this critical period.

- A strong argument can be made that the EFP should be a complete food. A complete food may help prevent the onset of nutritional deficiencies and ameliorate outbreaks of epidemic illness.

- There are other uses for the EFP beyond the critical niche during the initial stages of an emergency. In addition to its use as a take home ration, it may also be effective as a micronutrient vehicle in some circumstances.

- Available information and anecdotal evidence suggests that the most accepted and cost effective type of compact food in both a general ration and in feeding programs is a high energy biscuit with little or no flavorings except sugar.

- The needs of infants and young children and their caretakers are critical when considering the use of compact foods.

- The risk of diversion and theft of compact foods is a great and real concern. Evidence suggests that the packing and type of compact food may determine the likelihood of diversion.

- Several types of packing will be required for a compact food so that is suitable and readily available for different situations.

- Few guidelines on the use of compact foods inform program managers what to do in the initial stages of an emergency or where water or fuel supplies and cooking equipment are limited or unavailable.

Recommendations

The EFP should be:

- regionally pre-positioned for immediate **delivery within 48 hours**;
- designed to be **eaten for up to 15 days,** recognizing this is a planning figure;
- a **complete wholesome** food;
- **energy and nutrient dense**, at least 500 kcal/100g;
- made available in a **variety of packages** suitable for different situations;
- packed in such a way so as to minimize diversion and theft and **maximize shelf life;** and **easy to open** without tools; outer **packaging should be re-usable;**
- **clearly labeled** on the inner and outer packaging--pictographs are essential;
- **suitable for children 6 months and older** to hold and suck and eat as porridge;
- **culturally acceptable--**no animal fats from meat, blood or by-products should be used; and **edible** (oats or wheat are preferred cereal base, sugar need be the only addition).

1 INTRODUCTION

THE NEED FOR A COMPACT FOOD

Since the end of the cold war, the international community has been faced with an increasing number of manmade and natural humanitarian emergencies. The number and size of emergencies are escalating at an alarming rate and the number of people affected is greater than ever before. Two billion people were affected by war and disaster in the last decade. The number of uprooted people worldwide requiring food and humanitarian assistance has tripled since the mid-1980s and currently stands at approximately 34 million. Of these some 13.7 are refugees and 20.3 million are internally displaced persons.[1] Mass population movements have not occurred equally around the world. Africa has been the source as well as the host to refugees and IDPs for decades, but the new republics from the former communist bloc are a more recent addition to global forced migration. Identity conflicts in Azerbaijan and Armenia, the former Yugoslavia, the Caucuses, Central Asia and portions of Russia have spawned large numbers of forced migrants. [2]

Mass displacement and populations on the move are often reliant on donor commodities. In emergencies in remote and physically insecure areas, relief agencies are faced with considerable obstacles in providing appropriate and nutritious food on a timely basis to uprooted populations. Donors often confront logistical problems in storing, procuring and delivering traditional commodities such as bagged foods during the initial stages of an emergency. To date, it is common practice for the U.S. to procure compact rations with scarce dollar funds from producers outside the U.S. because as yet, there is no appropriate nutritionally dense compact ration produced for this purpose in the U.S. Emergency rations from non-US sources cannot be procured out of the P.L. 480 Title II food aid budget because procurements are legislatively restricted to U.S. food sources.

In financial terms, food assistance is the single most important response of the international community to current emergencies.[3] Worldwide estimates of people requiring emergency food aid continue to increase. The number of people requiring emergency food aid to meet their basic nutritional needs presently exceeds 26 million, many of these are women and children. In some instances, these populations are on the move or otherwise require a compact ready to eat food at some stage of the emergency. The numbers requiring such a food have been assumed to be relatively small at any given time, but exact figures are not readily available. The objective of USAID emergency food aid is to 'save lives' by alleviating hunger and starvation and thereby preventing malnutrition and mortality by meeting the critical food needs of targeted groups. In seeking to meet critical food needs, USAID stresses that the "do no harm" principle also be adopted so that people are assisted according to the "five rights": the right-food, right people, right time, right place and in the right way. [4]

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[1] Center for Research on the Epidemiology of Disasters cited in *World Disasters Report* (International Federation of the Red Cross/RCS: 2001).

[2] Based on vast field experience, Cuny notes that the primary reason for flight is security. He further notes that many returns occur while conflict is still in progress. At this important juncture, aid provision often diminishes. "Ricochet" repatriation, when those who fled out of panic and chaos, promptly return home occurs in nearly every crisis. See F. Cuny et al., *Repatriation During Conflict* (Center for the Study of Societies in Crisis: 1992).

[3] J. Jaspars and H. Young, *General Food Distribution in Emergencies: From Nutritional Needs to Political Priorities* (Relief and Rehabilitation Network, Overseas Development Network: 1995).

[4] USAID/BHR/Office of Food for Peace Emergency Division, *PVO Guidelines for Title II Emergency Food Proposals and Reporting* (USAID: 1999 (Draft)). The "do no harm" approach encourages agencies to consider how their interventions may support conflict. See M. Anderson, *Food Aid in Conflict: Lessons from Experience* (2000).

Thus USAID has identified the need for a high energy, nutrient dense compact ration that would be suitable for uprooted people in emergency situations for short periods of time. Other possible uses are other situations where people have little access to food, cooking fuel and water such as a sedentary population cut off by conflict.

DEFINITION OF KEY TERMS

The term "emergency" implies a short or limited duration whereby people are temporarily in need of assistance. In reality most emergencies last longer than one year. The term "humanitarian crisis" is often used and refers to natural disasters, complex emergencies and post-emergency situations. Natural disasters are crises caused by earthquakes, hurricanes, volcanic eruptions, earthquakes, floods and tsunamis and are often referred to as sudden onset disasters.[5] Most emergencies are complex in nature and are thus termed "complex emergencies" and are characterized by conflict and insecurity, a break down in civil society, a lack of infrastructure and the inability of host governments to respond effectively to assist refugees or displaced persons. These characteristics have major implications for the provision of relief assistance. There are various stages of an emergency. The "period of flight" exodus of refugees or mass displacement is often referred to as the "initial phase" or "first phase" of an emergency. For the purposes of this paper the term "initial phase" of an emergency will be used.

The term "Emergency Food Product" (EFP) will be used throughout this paper to refer to the proposed USAID "ready to eat compact food." The term "compact food" will be used as a general term to cover a range of products such as biscuits, compressed food bars and nutrient dense pastes. The term "High Energy Biscuit" (HEB) is used to refer to cookies specifically designed for use in emergencies since this term is widely used internationally.

It is not within the scope of this paper to explore in any detail the complexities of forced migration and displacement. Nevertheless it is important to define terms. According to international law, refugees are persons living outside their states of origin. Internally displaced persons are displaced within the borders of their country of origin.[6] However the definition of "refugee" has been debated as distinctions between types of people leaving their homes have begun to blur. UNHCR has extended assistance and protection beyond those who meet the formal definition of "refugee" to include displaced persons, resident populations, "others of concern" and those considered stateless.[7]

[5] USAID/OFDA, *Field Operations Guide*, (Version 3.0) (USAID: 1998).
[6] IDPs outnumber refugees by more than two to one and the disparity continues to grow. Humanitarian assistance to IDPs is often inadequate, and highly contentious. IDPs may be difficult to distinguish from local populations, governments may have collapsed and lack resources, or assumed IDPS are opposition members.
[7] UNHCR, *The State of the World's Refugees: A Humanitarian Agenda* (Oxford University Press: 1997).

2 THE USE OF COMPACT FOODS

AN OVERVIEW

A range of compact foods is currently available both commercially and for use in emergencies. Some products have been specifically designed for use in emergencies, others were originally designed for other purposes but found to be useful in emergency situations. Very few formal reviews of compact foods exist.

Compact foods have had a long history of use in situations of limited food supply. They have been widely used in military rations, lifeboats and as survival rations for expeditions. Research institutions have also developed specialized bars and biscuits for use as nutritious supplements to the diet.[8] Current examples of this include a micronutrient-fortified cookie in Guatemala designed to help prevent anemia during pregnancy and high-energy groundnut-based biscuits used to increase the energy intake of pregnant women in the Gambia.[9] [10] Compact foods have also been used in hospitals and nursing homes and in the nutritional treatment of HIV/AIDS patients.

A wide range of high energy and high protein bars are available commercially and reflect both the growing interest in the US in nutritional supplements, particularly to "boost energy" and performance and the desire for people to have healthy food "on the go." Commercially available compact food bars fall into four categories: high carbohydrate bars; bars that have a 40/30/30 ratio of carbohydrates to protein to fat that are marketed as meal replacements; high protein bars aimed primarily towards bodybuilders; and supplement bars, marketed to persuade people to eat a bar that will supposedly make them healthier and more energetic. Cereal and granola bars manufactured by Kellogs, Quaker and Sunbelt as snacks are generally lower in micronutrient content/100g and higher in food coloring and additives than the bars noted above. The US army has its own version of an energy bar called "HOOAH." No formal research has been conducted on the effectiveness of such bars. Reviews that exist suggest that most bars are simply fortified candy bars and that there is no advantage in eating compact, energy bars other than convenience.[11] Table 1 compares the macro and micronutrient content of bars from each category (Annex 1).

High energy/protein biscuits have been used for several decades in emergency situations primarily in selective feeding programs for children. The Red Cross used milk biscuits for this purpose during the 1970's.[12] High energy, high protein biscuits were used extensively for emergency relief feeding programs in Ethiopia and Sudan in the 1980's. The wide interest in the use of biscuits led to an increased and varied supply (a total of 29 different brands were found in relief feeding programs in Ethiopia and Sudan). Other products originally developed for specific

[8] M. Clegg, "Groundnut Biscuits in the Treatment of Kwashiorkor," *British Journal of Nutrition* 14 (1960): 325-328.
[9] INCAP/PAHO, "Assessment of Acceptability, Consumption Behavior and Market Demand for a Nutritionally Improved Cookie Designed to Prevent Anemia during Pregnancy," (INCAP/PAHO Guatemala: 1998).
[10] World Health Organization, "High Energy Biscuits for Mothers Boost Infant Survival by 50 %." *State of the World's Children* (WHO: 1998).
[11] CSPI, "Bar Exam: Energy Bars Flunk," *Nutrition Action Healthletter* (CSPI: December, 2000).
[12] R. Buchanan, "The Australian Milk Biscuit," *Agricultural Science Review* 9:1 (1971): 19-24.

purposes were found to be useful in emergencies. For example, the compressed food bar BP5 was developed by the Norwegian Navy and manufactured by Compact, Norway, as rations to put into lifeboats thus accounting for the long shelf life and water resistant packaging. It has been termed "the original power bar." The Norwegian government agreed to provide surplus BP5 to UNICEF as part of its contribution to relief efforts. Since the 1980s, UNICEF has distributed a large amount of BP5 and continues to do so.

Based on a review of imported biscuits in relief programs by OXFAM in the 1980s (and to date the only formal review), it was concluded that biscuits have a limited but useful role to play in emergencies. Biscuits were found to be useful in the early stages of an emergency when few resources are available for the preparation of food (food, water, equipment and personnel). Biscuits were generally intended to supplement a very basic diet, which may consist only of cereals. However, in one area of Ethiopia, biscuits were the sole source of food for hundreds of families for up to 3 months. The most important aspects of nutritional composition were considered to be energy density, protein content and vitamin and mineral fortification. Packaging was found to be very important to avoid wastage. Sweet biscuits were found to be very popular with children in all feeding programs and eaten by adults too. The texture of the biscuit was also found to be important. The rate of breakdown in the mouth or in liquid was important. Biscuits that broke down readily could be crumbled in a liquid to make porridge for infants.[13] OXFAM UK developed its own specifications for a high-energy biscuit the 1980s. At 125kcal/biscuit, it was the most energy dense biscuit available.[14] OXFAM no longer uses this product.

In recent years, there has been a mushrooming of compact food products for use in emergency situations. This reflects both the growing number of emergencies and the increased need for readily available products that can be easily transported and used immediately. Some products aim to provide a high- energy supplement or 'stop gap' ration for general or selective feeding. Examples include BP5 made by Compact, Norway, Plumpy'food made by Nutriset, France and Mainstay made by Survivor Industries, US. Various types of High-energy biscuits (HEB's) are also in circulation made by various manufacturers for WFP, UNICEF and NGOs.

Compact bar products have specifically been developed for use in the rehabilitation phase in the treatment of severely malnourished adults and children. Examples include BP100 (Compact) and Plumpy'nut (Nutriset).[15] These products are often referred to by the term "ready to use therapeutic food" (RUTF). A recent study by Action Contre Faim (ACF) found that RUTF were used successfully in certain situations.[16] RUTF are designed to be used where:

- The security situation makes it impossible to run a therapeutic feeding center
- Take-home food is required during nights and weekends when TFCs are closed

[13] H. Young et al., "A comparison of biscuits used in emergency relief feeding programs in Ethiopia and Eastern Sudan-1985-1986," *European Journal of Clinical Nutrition* 42 (1988): 261-271.
[14] H. Young et al., "Development of a high-energy biscuit for use as a food supplement in disaster relief," *Journal of Food Technology* 20 (1985): 689-695.
[15] The nutritional composition of BP 100 and Plumpy nut are based on the F100 formula. This is a medical food specifically designed for use during the rehabilitation phase of treatment of severely malnourished adults and children after appetite has returned. The basic ingredients are skimmed milk, sugar, cereal flour, oil and mineral and vitamin mix. Both products contain iron and are unsuitable for use in the initial phase of treatment of severely malnourished individuals. See WHO, "Management of Severe Malnutrition," (WHO: 1999).
[16] A. Briend et al., "Ready to Use Therapeutic Food for the Treatment of Marasmus," *Lancet* (1999): 354.

- Severely malnourished people refuse to come to a center and malnourished adults and adolescents refuse a milk-based liquid diet commonly fed to children and demand solid food

In response to the need to fill the gap for a short-term ration in the first phase of emergencies, the U.S. Department of Defense developed Humanitarian Daily Rations (HDRs) in 1993. The HDR was based on the concept of the Meals Ready to Eat (MREs). The HDR was designed specifically to meet the needs of civilians in humanitarian relief efforts. HDRs are designed to be acceptable for all ethnic and religious groups and thus contain no animal products unlike the MREs. The purpose of the HDR is to "provide extra energy and high protein in a daily ration to maintain a malnourished person's health at a stable level for short periods of time (30-60 days) until foods can be provided through traditional relief efforts. The HDR is a "stopgap feeding asset." [17] HDRs contain vegetable entrees, crackers, jelly and other accessories.

A comparison of existing products used in emergencies can be found in Table II (Annex 2). A comparison of macro and micronutrient content of selected compact and blended foods can be found in Table III (Annex 3).

ADVANTAGES AND DISADVANTAGES

Some of the key advantages of compact dry foods that would make them useful in emergency response are summarized below in Box 1. Specific advantages and disadvantages of each product may be found in the technical cards in Annex 4.

BOX: 1: **Advantages and Disadvantages of Ready to Eat Compact Foods**

ADVANTAGES	DISADVANTAGES
▪ Require no preparation and therefore no additional resources are required to prepare food (fuel, cooking and serving equipment, water and trained personnel) ▪ A long shelf life and can therefore be pre-positioned for preparedness. ▪ Low moisture content limits microbial growth ▪ Energy and nutrient density means a high weight/volume ratio ▪ Easy to handle, transport and distribute ▪ Can be dropped by air	▪ Expensive compared with traditional bagged ration items ▪ May be attractive as a combat ration and thus prone to diversion ▪ Maybe culturally unfamiliar and thus prone to wastage ▪ Difficult to open and dispose of outer wrappings without a knife or scissors. ▪ May be commercially tradable and not consumed directly ▪ Lack of guidance can lead to poor coordination and erratic use

[17] OFDA, *Field Operations Guide* (USAID/OFDA: 1998).

CURRENT GUIDELINES ON THE USE OF COMPACT FOODS

There is little information on the use of compact foods in the standard manuals. USAID currently follows guidelines which recommend that compact foods serve a special niche; in the initial phase of emergencies, during repatriation, and in situations where cooking fuel, water and other food commodities are unavailable.

While compact foods and HEBs are widely used in emergency situations, there are few published guidelines on their use. There is limited reference to compact foods and HEBs in the standard emergency manuals. The lack of consistent guidelines may be one reason why the use of compact foods and HEBs has been somewhat erratic and with mixed results. Some guides and manuals only refer to one product, where in practice, field-workers may be dealing with a number of various commodities from various sources. Most guidelines do not recommend how much to give under what circumstances. In some cases there is contradiction in the same guidelines. Generally the prevailing view seems to be that compact foods (particularly HEBs) are recommended to be used in feeding programs and that in extreme circumstances they could be distributed as part of a general ration. Unfortunately these extreme circumstances are increasingly common and its seems that guidelines have not kept up with practical realities.

In some widely used manuals there is a complete absence of recommendations for meeting the food needs of populations in the initial stages of an emergency before a food basket is established or when people are on the move. Not surprisingly the recommendations in agency guidelines vary according to their objectives and mandate or role. Some guidelines briefly caution their staff against the use of certain compact foods for fear that they may end up being diverted or looted.[18] The International Federation of the Red Cross/Crescent advises against canned baby food, canned fruits, cheese, soups, frozen foods, candy and military style rations in a general distribution and recommends that the use of biscuits be restricted to the night meal in therapeutic feeding centers.[19] Box 2 cites references to the use of compact foods in commonly used guidelines.

[18] Medecins Sans Frontieres, *Nutrition Guidelines* (1995).
[19] IFRC, *Handbook for Delegates* (Geneva: 1995).

BOX 2 : **Commonly Used Guidelines: References to the Use of Compact Foods and HEBs**

- "Biscuits are expensive, but they are very convenient in an emergency. Use them as an enticement to screening sessions, when you run out of water or fuel and when the supply of other foods fails. Use them to fill gaps between planned meals and reduce the need for staff, fuel and kitchen space/ cooking time and as a take home ration."

  Drought Relief in Ethiopia: Planning and Management of Feeding Programs, SCF, 1987

- "Sometimes high-energy/high protein biscuits will be available from donors. Although their nutritional value is considerable, be aware that they can be rather popular with other family members and raise a good price on the market. Therefore, if a dry ration is offered, do not include the biscuits in the calculation of the ration size. These biscuits are particularly useful for the initiation of wet feeding programs in situations where other commodities are not yet available and cooking is difficult."

  MSF Guidelines 1995

- "In supplementary feeding programs, food must be energy dense and rich in micronutrients, culturally appropriate, easily digestible and palatable. In situations when cooking may not be feasible, ready to eat items such as high-energy biscuits or locally made snacks can be used. High-energy biscuits can also be given during the rehabilitation stage in therapeutic feeding."

  UNHCR/WFP Guidelines for Selective Feeding in Emergency Situations, 1999

- "High-energy and protein biscuits are *sometimes* used early in the [selective feeding] program. These biscuits are specially blended to be a high-protein and high-energy food supplement in a dry, easy to distribute form. However their use is not encouraged for supplementary feeding because they serve a special niche, where cooking facilities are unavailable for an emergency feeding program or for distribution as a supplementary food source for a displaced population on the move."

  OFDA FOG (III-40), 1998

- "Biscuits have a limited number of uses. Their main use for WFP is as an emergency ration in the first few days of an acute emergency or as a food to be carried by returnees or other populations during transit. A secondary use is in therapeutic feeding for night feeds, or take home supplements to encourage appetite."

  Emergency Ration Biscuits, WFP (unpublished internal guidelines)

- "BP5 biscuits can be used during the initial phase of man-made and natural disasters in the early phases of mass feeding operations, during the period of flight or repatriation where no other food can be made available or because of lack of fuel, equipment. There is no need for such products if there is any access to local markets. In repatriation operations, they can be provided as a basic ration for a very short period [up to a week] in transit centers or during the journey."

  WFP Emergency Food Ration Guidelines on the use of BP5 Biscuits (unpublished)

3 THEORETICAL FOOD REQUIREMENTS AND BASIC PRINCIPLES

Malnutrition in one or more of its various forms frequently characterizes emergency situations, both natural and man-made. Ensuring that the food and nutrition needs of disaster-stricken populations, refugees or internally displaced people are adequately met is often the principal component of the humanitarian logistic and financial response to an emergency. When the nutritional needs of a population, or population subgroups are not completely met, some form of malnutrition soon emerges.[20] Food aid responses in times of emergency continue to cause criticism and debate despite a plethora of new guidelines and standards.[21] Problems ranging from poor palatability, inadequate energy, culturally inappropriate foods, micronutrient deficiencies to increased deaths resulting from poor quality and quantity of the diet provided have been issues. The level of requirements is also a contentious issue.

REFERENCE VALUES

Energy: Little may be known about the composition of the population except the number of people. As such, standard guidelines for meeting energy and protein requirements can be extremely useful in making decisions regarding the immediate procurement of food for use as emergency rations. The Committee on International Nutrition (CIN) report in 1995, estimated the mean per capita energy requirements in emergencies to range between 1,900 and 2,500 kcal. The average per capita requirement for a typical developing population is 2070kcal/person/day rounded up to 2,100.[22] It is recommended that the average figure of 2,100 be used for planning purposes and to expedite decisions about the immediate initial provision of food. The initial planning figure should be readjusted at the earliest opportunity through an in-depth assessment of the situation, and the ration revised according to prevailing conditions. [23] If average daily energy intake falls below the mean requirement, the basic nutritional needs of many in the population are unlikely to be met and will increase the risk of continuing malnutrition and ill-health particularly in young children and pregnant women. It may also delay the recovery time for a population already debilitated by prolonged food deprivation and exposure to frequent infection.

Protein: Current recommendations suggest that protein should provide at least 10-12 percent of the total energy. When the planning figure of 2100kcal is used, then 52-63g protein would be required. When energy needs are being met by a range of commodities (cereal, pulses, and blended foods), protein content is usually not an issue. It is more important to ensure adequate levels if there is reliance on one commodity.

[20] WHO, *The Management of Nutrition in Major Emergencies (*2000).
[21] Sphere Project, *Minimum Standards in Nutrition* (2000).
[22] This is consistent with the value of 2100kcal recommended by the Committee on Nutrition, National Academy of Sciences and published in: *Estimated Mean Per Capita Energy Requirements for Planning Emergency Food Aid Rations*, (Washington, D.C., National Academy Press: 1995).
[23] The average figure of 2100kcals covers the energy needs of a "typical" population assuming standard population distribution, body size, ambient temperature, pre-emergency nutritional status and a light physical activity level of 55% above BMR for males and 56% for females. Prevailing conditions take into consideration various factors such as demographic characteristics, activity level, environmental temperature, health nutritional and physiological status and household food security. See WFP/UNHCR, *Guidelines for Estimating Food and Nutritional Needs in Emergencies* (1999).

Fats: Fat or oil in the ration enhances palatability and provides energy in a concentrated form. This is useful in for the rehabilitation of all undernourished adults and children. Both oil and sugar can provide a considerable increase in the energy density of the diet. In order to meet the requirement for certain essential fatty acids, it is recommended that fats/oils provide at least 15% of the total energy intake for adults (20% for women of reproductive age and 30-40% for children up to 2 years). Overall, fats/oils should comprise at least 17% of the ration amounting to 40g/2100kcal. Saturated fatty acids should not provide more than 10% of dietary energy.[24]

Micronutrients: Ensuring adequate micronutrient requirements is essential. Lessons learned over the last decade or so have shown that food-aid dependent populations are at high-risk for micronutrient deficiency diseases. Food rations have frequently been characterized by deficiencies.[25] [26] Rations are generally based on cereals, usually with added pulses and oil and sometimes with sugar and blended foods (cereal-pulse mixes). These foods are commonly rather low in absorbable iron and in vitamins A and C and devoid of vitamins B6 and B12. Deficiencies can arise even when food supplements are regularly provided, if the range of foods eaten is limited. Where rations are provided to a population that lacks ready access to other foods, including fresh foods, it is essential to ensure that they contain appropriate quantities of vitamin A, thiamin, riboflavin, vitamin C, iron, iodine and folic acid.

WHO, WFP and UNHCR have identified the following nutritional requirements for refugees in the initial phase of an emergency (Box 3):[27] [28]

BOX 3: **Recommended Mean Daily Per Capita Intakes for a Typical Population Requiring Emergency Food Aid in a Developing Country**

NUTRIENT	Mean Population Requirements
Energy	2100
Protein	10-13% (52-63g), but <15
Fat	17% (40g)
Vitamin A (retinal equivalents)	1666 IU (or 0.5mg RE)
Vitamin D	3.2-3.8ug
Thiamin (Vitamin B1)	0.9 mg
Riboflavin (vitamin B2)	1.4 mg
Niacin equivalents	12.0 mg
Folic acid	160 mg
Vitamin B12	0.9 ug
Vitamin C (ascorbic acid)	28.0 mg
Iodine	150 ug
Iron	22mg (low bioavailibility (ie 5-9%)

Source: Sphere Guidelines, 2000

[24] FAO, "Fats and Oils in Human Nutrition: Report of a Joint FAO/WHO Expert Consultation," FAO/Food and Nutrition, Rome, 57 (1994).
[25] "Alleviating Micronutrient Malnutrition in Relief Settings," Presentation by Rita Bhatia in *Enhancing the Nutritional Quality of Relief Diets: Workshop Proceeding, (*April: 1999).
[26] K. Hilderbrand et al., "Food Rations for Refugees," *Lancet* 351 (1998): 1213-1214.
[27] WHO, *The Management of Nutrition in Major Emergencies* (WHO: 2000).
[28] WFP/UNHCR, *Guidelines for Estimating Food and Nutritional Needs in Emergencies*, 1999.

Certain nutrients not mentioned on the list above are also highly important constituents of an adequate diet and have been found to be essential in the diets of vulnerable populations. For example, magnesium, potassium, zinc, copper and selenium deficiencies are common in malnourished children and adults. In the absence of population requirements for these essential nutrients, the following nutrient densities are proposed as a provisional planning tool. The desirable nutrient densities relate to a refugee diet. The lower threshold density is suggested as the minimum value below which the nutrient density of the whole diet should not fall. (Box 4) [29]

BOX 4: **Mineral Values: Provisional Nutrient Densities**

Values/per 100 kcal	Unit	Desirable Nutrient Density	Lower Threshold Density
Potassium (K)	mg	190	74
Sodium (Na)	mg	60	26
Magnesium (Mg)	mg	30	10
Calcium (Ca)	mg	84	28
Phosphorus (P)	mg	70	21
Zinc(Zn)	mg	0.9	0.4
Copper (Cu)	ug	95	28
Selenium (Se)	ug	3.6	1.85
Manganese (Mn)	umol	0.3	
Chromium (Cr)	nmol	2.0	
Molybdenum (Mo)	nmol	5.0	
Fluorine (Fl)	umol	<1	

Source: Sphere Guidelines, 2000

ISSUES REGARDING THE REQUIREMENTS

The reality of meeting nutritional needs is a complex balance of logistics coordination, access, availability, acceptability, security and the current health and nutritional status and situation of the recipients. Let us examine briefly several issues relevant to the EFP.

- Providing an adequate ration
- Meeting the requirements of nutritionally vulnerable populations
- The intended target population receives and consumes the ration

[29] M. Golden, A. Briend, and Y. Grellety, "Report of a Meeting on Supplementary Feeding Programs with Particular Reference to Refugee Populations," *European Journal of Clinical Nutrition* 49 (1995): 37-145.

Providing an Adequate Ration: Principles and Practice

There is evidence to suggest that the highest possible planning figure should be used for populations in the early stages of an acute emergency when the population is totally dependent on outside food assistance. This figure may still need to be adjusted, but it may reduce or eliminate the need for special targeted or selective feeding programs for vulnerable groups. A higher planning figure also takes into account anticipated shortfalls in the food pipeline, as is common in the early stages of an emergency, sales and bartering, sharing and diversion and the weakened nutritional and immune status of the targeted populations.

In theory, food rations should not only provide adequate levels of energy, but also be nutritionally well balanced. Both quality and quantity need to be considered, so that adequate amounts of protein, fat and micronutrients should be supplied. Food rations should be such that they meet the needs of individuals within a population. Pregnant and lactating women have additional nutrient needs. Infants and young children may have difficulty consuming or digesting food provided because of their proportionally high nutritional requirements. Families or individuals may have needs that are not be met by a particular ration distribution system. According to WFP/UNHCR, the basic principles that relate to the **initial stage** of an emergency state that:[30]

> *"Ensuring an adequate basic ration for the affected population is of the utmost importance at the onset of an emergency. The availability of such a ration will reduce the need for other costly and cumbersome interventions."*
>
> *"When the population is entirely dependent on food assistance, the external provision of food must cover its minimal requirements. Affected populations may not be dependent on food assistance alone, but can obtain access to some other sources of food."*
>
> *"Priority must be given to assuring adequate nutritional energy during the first period following an emergency event. A complete food basket should be mobilized and distributed as soon as possible, to ensure provision of adequate amounts of energy, protein and fat. Essential micronutrients should also be provided to safeguard adequate micronutrient levels."*

While these principles are generally agreed upon, there are problems meeting this in practice. There is continued debate over what constitutes an appropriate level of ration for persons in situations of total food dependency. For example, while the planning figure for rations of 2100 kcal is widely accepted, WFP still persists in using 1500 kcal as a maintenance ration level for the first week or so of an emergency. Indeed recommendations from the manufacturers of BP5 and other compact foods use this figure in recommending how much of the product to provide in a general ration.[31] Data show that increased mortality tends to be associated with low-energy rations (irrespective of other food supplies) especially at levels below 1500 kcal.[32] Importantly the policy of the Red Cross differs from that of WFP/UNHCR recommendations for energy requirements. Based on substantial field experience and data, the ICRC uses a higher planning

[30] WFP/UNHCR, *Joint Guidelines for Estimating Food and Nutritional Needs in Emergencies* (1999).
[31] Manufacturer's recommendations for the use of BP5.
[32] J. Wallace and J. Mason, "Association between Mortality and Kcal Supply," *RNIS Notes* (15 July 1994).

figure of 2400kcal for an average population, thereby purposefully avoiding expensive selective feeding programs or mounting them at a much lower level. This policy is based on the following key principles: [33]

> *"Provision must be made to cover the nutritional needs of pregnant and lactating women, people exposed to cold stress as well as those physically active."*
>
> *"People may already be malnourished or ill before the onset of a relief operation so higher intakes are needed to rehabilitate beneficiaries and to ensure adequate catch-up growth in children (no need for separate selective feeding programs)."*
>
> *"Losses during transport, storage and distribution must be taken into account."*

The concept of an "adequate" general ration for everyone in the affected population and special programs for vulnerable groups implies that people belonging to vulnerable groups are in the minority. In fact, if traditional categories of vulnerable groups are examined, it is clear that a huge proportion of emergency affected displaced populations belongs to a vulnerable group and several vulnerable groups are usually represented within one family. The composition of these vulnerable groups in the initial stages of an emergency may include: the malnourished and those vulnerable to malnutrition, those with increased requirements such as pregnant and lactating women and women of reproductive age. Infectious disease also increases requirements. The socially vulnerable should also be included, because their access to food is reduced. This group includes, orphans, the elderly, disabled and single parent families.[34]

Even if the general ration is adequate in terms of meeting the energy requirement of the population as a whole, this does not mean that it is adequate for each individual within that population. Energy requirements differ from requirements of protein, vitamins and minerals in that the recommended requirement for an individual is the average requirement for a group of individuals of the same age, sex and weight without provision for the known individual variation. If everyone eats exactly the planned number of calories, some individuals will always be underfed. The needs of individuals will only be covered if redistribution of food occurs within and between recipient families, in proportion to their physical needs. Yet in practice this often does not happen. During refugee exodus and during conflict, social networks between families of population groups may have broken down and families split up. Displaced populations often include high numbers of single parent families and orphans, who may be excluded from networks of redistribution.

Recommended Daily Allowances for some micronutrients vary quite considerably causing confusion regarding what is appropriate for certain populations and which benchmarks to use. Difficulties arise when attempting to cover the needs of whole populations under nutritional stress as may be the case in the initial stages of an emergency. However if the energy needs of individuals within the population are met it has been argued that other nutrients will follow. Thus, according to this line of argument, if the EFP is designed to meet energy requirements and

[33] Arianne Curdy (ICRC), *personal communication.*

[34] A. Curdy, "The Relevance of Supplementary Feeding Programs for Refugees, Displaced or Otherwise Affected Populations," Paper presented at the Workshop on the Improvement of the Nutrition of Refugees and Displaced People in Africa, Machakos, Kenya, 5 December (ACC/SCN, Geneva: 1994).

the amount of each nutrient is set at the highest nutrient density (nutrients/100 kcal) for any group within the population, then the group with the highest requirements will have their needs met and other groups within the population will take slightly more than the recommended requirement.[35]

Meeting Requirements of Nutritionally Vulnerable Populations

> *Not enough is known about dietary requirements in hostile environments, the amount of nutrients required for the body to resist disease or the nature and extent of pre-existing deficiencies. Given this lack of information, it makes sense to begin with the premise that emergency affected populations have the same metabolism as everyone else and to start with US RDIs (recommended daily intakes) and extrapolate from those.*

Research into requirements has thus far been conducted almost exclusively in western countries on healthy people and thus does not necessarily reflect the requirements of populations living in regions with endemic malaria or a high prevalence of infectious diseases. Field observation reveals that upon arrival at a destination site, most crisis-induced migrants are traumatized, suffering infections and malnutrition and without many assets. Indeed numerous field nutrition surveys lend weight to this observation and suggest high rates of moderate wasting and stunting in many emergency-affected populations. Evidence has shown that stunting is associated with up to half of all childhood deaths worldwide. Some 40% of children worldwide are stunted at baseline. Even mild to moderate malnutrition contributes to child mortality and the risk of death increases significantly with the severity of malnutrition.[36]

Given that many crisis affected populations are likely to be malnourished at baseline, it is probable that stores of the so- called Type I nutrients such as iron, ascorbic acid and vitamin A will be depleted. Nutrients such as potassium, magnesium and zinc, known as Type II nutrients, will already be lost. Deficiency in any of these nutrients leads to reduction of appetite and weight loss. During catch up and following nutritional stress of adults and children, all the Type II nutrients have to be given in the correct balance and in much larger amounts that the RDAs for normal growth or body maintenance. Nutrients such as protein need adequate zinc, phosphorous and magnesium or potassium in order to be absorbed. Indeed it has been suggested that in considering the fortification of food aid commodities it might be more beneficial and cheaper to lower the protein and increase other Type II nutrients to ensure a complete balance.[37]
It is not too far-fetched to argue that we are usually not dealing with a "healthy" population by the time the international community responds to a crisis. The RDAs for normal healthy populations are already insufficient to ensure optimal health in refugees and IDPs and yet there is a prevailing assumption that they need less. Recommendations have been developed by the

[35] The nutrient:energy ratio is discussed in detail in the paper by Michael Golden.
[36] D. Pelletier, "The Effects of Malnutrition on Child Mortality in Developing Countries," *Bull* WHO, 73:4 (1995).
[37] Certain types of nutrient deficiencies cause the body to respond in different ways. The first response (Type 1) is to keep growing and to use up the nutrient in the body, at which point the specific metabolic function that depends on the nutrient declines and the person becomes ill. The illness has characteristic symptoms so that a deficient nutrient can be identified and remedied. Examples of Type I nutrients include iron, ascorbic acid and vitamin A. The second response (Type II) is for the body to stop growing or break down its own tissue to conserve the nutrient in the body. Other Type II nutrients are lost in the process. See Michael Golden, "Practical Approaches and Methods to Meet Nutritional Adequacy," in *Enhancing the Nutritional Quality of Relief Diets: Workshop Proceedings* (April, 1999).

Scientific Advisory Committee of ACF (Action Contre Faim), known as the Golden, Briend Grellety (GBG) recommendations. GBG recommendations are derived from a combination of UK and EU Population Recommended Intakes (PRI) with adjustments for populations under stress and are thus more stringent than the planning figures used above. Many refugees and IDPs already have micronutrient deficiencies as a result if malnutrition, disease, hunger and diarrhea. To compensate for reduced availability of nutrients due to gastrointestinal disease and to allow for increased weight gain, increments are added. An additional increment is made for those nutrients that are crucial for the antioxidant and immune systems, as many IDPs and refugees are subject to contaminated environments with endemic infectious diseases.[38]

Even if the foods provided to a population meet the specified requirements, this cannot be taken as a proxy of adequate intake and utilization of micronutrients by the body. Losses can also occur during transportation, storage, processing and cooking. Absorption of various nutrients may be impaired. Phytates may impair the absorption of iron originating from vegetable sources. Since the EFP will be cereal based, it will be important to take into consideration the low bioavailbility of iron, calcium, magnesium and zinc. GBG recommendations allow an additional increment of up to 20% for the transition metals and phosphorous because of low bioavailability.

The Need for a Complete Food

Assuming that the EFP is to be the only food source for dislocated people during the initial stages of a crisis, there is good reason to advocate for a complete wholesome food that contains all the essential nutrients necessary for health in sufficient amounts to meet the entire needs of all the individuals within the recipient population. A complete food may help prevent the onset of nutrient deficiencies and ameliorate outbreaks of epidemic illness in the initial stages of a crisis and save lives.

Strides have been taken to meet the minimum standards for certain micronutrients in relief food. Fortification levels for precooked, fortified blended foods ordered by UNHCR/UNICEF/WFP are based on the guidelines on formulated supplementary foods for older infants and young children of the Codex Alimentarius.[39] The guidelines state that 100g of the supplementary food should provide approximately two-thirds of the recommended daily requirements for certain micronutrients. WFP applies these guidelines to the specifications for HEBs. Specific recommendations have been made to USAID and USDA for measures to improve the delivery of micronutrients through the Title II, P.L.480 food aid program.[40] However, to date most foods supplied in relief situations have not been sufficiently analyzed for **all** essential nutrients. What little information exists indicates that many of the best foods distributed are inadequate as a sole source of nutrients for the target population when compared to US, UK, Australian and EU standards and fare even worse when compared to the GBG standards. [41] As noted above many IDPs and refugees may already have micronutrient deficiencies. It is paramount that if the only food source available to the population is met by food aid, this food "needs to be adequate in

[38] M. Golden, A. Briend and Y. Grelletty, Report of a Meeting on Supplementary Feeding Programs with Particular Reference to Refugee Populations, *European Journal of Clinical Nutrition* 49 (1995): 137-145.
[39] FAO/WHO, *Joint FAO/WHO Food Standards Program*, Codex Alimentarius Commission, Vols 1-14.
[40] SUSTAIN, *Final Report of the Micronutrient Assessment Project*, submitted to USAID, 1999.
[41] U. Tohill, "Minerals in Refugee and Weaning Foods," *Unpublished Thesis* (University of Aberdeen: 1999).

quality and quantity, meeting requirements for calories, protein and micronutrients **in full**." [42] There are several reasons for ensuring that the EFP is a complete food.

The first argument for ensuring a complete food is that nutrients deemed essential for health and well-being are likely to be even more critical to populations suffering nutritional privation.

The second reason stems from evidence that a dislocated and nutritionally vulnerable population is more likely to suffer from infection and thus the risk of epidemics in the early stage of a crisis is heightened. The nutrition/infection cycle has been well documented. It is less clear if the provision of an adequate diet during the early stages of a crisis can act as a 'protective factor.'[43] The example of Sarajevo can be used to illustrate this point, where despite the complete breakdown of sanitation and the crowding of people into dank, dark collective centers, there were no major epidemics. One may postulate that the difference between this and other similar situations is that the population of Sarajevo received adequate quantities of good quality of food during the early stages of the siege.[44] Thus, if the baseline nutritional status of the population is poor and the environment contaminated, the early provision of a well designed complete food has the potential to correct pre-existing nutritional deficiencies and ameliorate epidemic outbreaks and save lives.

Finally, some have argued that food aid during the initial stage of a crisis only need to 'maintain' a population. If the EFP is not a complete food then it will need to be replaced after the 15 days by a fortified and varied food basket in order to avoid deficiencies. The typical food basket is designed for a "healthy population" and is usually not adequate for "catch-up." Thus a complete EFP would bridge a critical gap.

The Intended Target Population Receives and Consumes the Ration

The importance of ensuring that the complete compact ration reaches and is consumed by the intended beneficiaries is critical. The fact that the EFP may potentially be traded, sold or diverted must be factored into the design, composition and packaging.

While much of the debate surrounding the ration is theoretical, in reality, much more weight should be given to ensuring that the recipient population ***actually receives*** and consumes the ration. The lack of significance attached to this stems from the perception that food distribution is a simple matter of handing out food and requires little thought. Over a decade ago, John Seaman noted that " *the problem of relief food is not to design a nutritionally adequate ration, but to ensure that the population has access to it.*"[45] Lack of effective coordination, logistical problems and poor management have had a large impact on getting relief food to people and contributed to malnutrition and death in numerous situations. While addressing these factors are beyond the scope of this paper, it is important to recognize the importance of ensuring that the EFP reaches the affected population in a timely manner.

[42] J. Mason et al., "Misconceptions on the Nutrition of Refugees," *Lancet* 340 (1992): 1354.
[43] H. Young and S. Jaspars, "Nutrition, Disease and Death in Times of Famine," *Disasters* 19: 2 (1995).
[44] Victor Tanner and John Fawcett, *Personal communication.*
[45] J. Seaman and R. Rivers, "Strategies for the Distribution of Relief Food," *The Journal of the Royal Statistical Society* Series A, 151: 3 (1988): 464-472.

Evidence has shown that uprooted communities become malnourished if their only resource is food aid provided at the level of physiological requirements. A certain portion of this will likely be traded to provide for other basic essentials (water, shelter, clothing, soap, fuel and transport). Furthermore, the section of the population with the greatest array of non-food needs and the least ability to meet them - the socially vulnerable categories, are usually obliged to dispose of parts of their ration to meet other requirements. Dislike for a distributed food or preference for a culturally acceptable food is one of the key reasons for trading or selling the food.[46] The high degree of wastage of Mainstay bars in the Balkans for instance was attributed to distaste for the product and the fact that camps were "flooded with preferred food items" and that refugees were exercising control and the right to choose what they ate.[47]

The debate over 'high value' verses 'low value' commodities flourishes and is particularly relevant in the discussion of an EFP. Some evidence exists to suggest that the more expensive (value on the local market) and nutrient-rich the food, the more likely it is to be sold for cash. Examples include vegetable oil. HEBs have also reportedly been widely sold in markets. The converse argument is that low value commodities will be less likely to be sold.[48] Yet there are strong arguments to tolerate trade of food rations. The notion that food is traded for other food and non-food items is well accepted. Evidence suggests that micronutrient epidemics are associated with areas where people have been unable to trade or to secure access to other food. Nevertheless the "quartermaster syndrome" on the part of donors and some humanitarian organizations which resists meeting needs other that physiological requirements still persists resulting in the cutting of rations due to misconceptions regarding sales of food aid.[49] [50] USAID would prefer that the end user be motivated to consume the EFP rather than to trade or sell it. However in practice, program officers recognize that it is very difficult for operational agencies to control end users in highly fluid emergency situations.[51] In theory, the need to provide more than the physiological requirements presumably drops off as more alternative resources become available and as families become better able to cope.

[46] K. Wilson, "Enhancing Refugees' Own Food Acquisition Strategies," *Journal of Refugee Studies* 5 (1992): 226-246.
[47] Susan Bradley, USAID Food For Peace, *personal communication.*
[48] S. Hansch, "Diet and Ration Use in Central American Refugee Camps," *Journal of Ref Studies* 5 (1992): 300-312.
[49] A. Mourey, "Issues Regarding Humanitarian Assistance Operations," in *Report of a Workshop on the Improvement of Nutrition of Refugees and Displaced People in Africa, (*Kenya: 1994).
[50] B. Reed and J. Habicht, "Sale of Food Aid by Refugees Was a Sign of Distress Not Excess," *Lancet* 351(1998):129-130.
[51] Tom Marchione, USAID, *personal communication.*

4 FACTORS FOR CONSIDERATION IN THE DESIGN OF THE EFP

EXPERIENCES OF USING COMPACT FOODS IN THE FIELD

There is little doubt that the risk of diversion (not reaching the intended beneficiaries) and theft is important in the discussion on compact foods. Emerging consensus based on field experience suggests that compact foods fill a critical gap. The EFP needs to be culturally familiar and acceptable and edible in order to avoid wastage. High-energy, nutrient dense biscuits appear to be favored over other types of compact rations and less prone to diversion.

Given the absence of formal review or evaluation of compact foods, a wide range of agencies and individuals were asked to document and to share experiences of using compact foods (see Annex 5 for key contacts). A summary of key points is noted below. The information is anecdotal, but maybe important in designing the EFP.

- Based on extensive field experience, WFP, UNHCR, OXFAM UK have found that the more "cookie like" in shape and taste, the more likely the HEBs are to be eaten by beneficiaries of all ages. A cookie type of product is widely familiar. Neutral tasting biscuits (without added flavors and colors) are less likely to be wasted. [52]

- Compressed food bars such as BP5 and Mainstay are not very popular when used as a general ration. Reasons cited for this were that they are dry, bland, it is hard to eat the required amount and they are unfamiliar to many populations. They require a lot of water to get them down. WFP noted complaints of indigestion in Timor and related this to the fact that insufficient water was provided with them and that the population did not receive information on how to make them into porridge for small children. BP5 is extremely popular for use in feeding centers and as a take home food.[53]

- The small size and compactness of BP5 and attractive space age packaging of Mainstay make them attractive as "combat rations." In some cases, people may be afraid to carry them for fear of being attacked by fighting forces. High-energy biscuits wrapped in simple packaging are less likely to be diverted and less attractive as combat rations because in many cases they are seen as food for women and children. [54]

- BP5 and HEBs have been traded by recipients but often because they can be sold for a good price on the market and the cash is used to buy other items. A number of examples exist where markets have been flooded with HEBs. Field staff have sometimes taken drastic measures to prevent them being sold or diverted such as smashing them up before distribution.[55]
- Sweet biscuits have been found to be very popular with children in feeding programs. The texture of the biscuit is important, the rate of breakdown either in the mouth or in liquid was

[52] Anne Canallan, WFP; Zara Mirghani, UNHCR; Hisham Khogali, OXFAM UK, p*ersonal communication.*
[53] Anne Canallan, WFP; Iain Levine, UNICEF, p*ersonal communication.*
[54] Zara Mirghani, UNHCR; Anne Canallan, WFP; Anna Taylor, SCF/ UK; Guillaume Legallais, MSF France, *personal communication.*
[55] Barabara Reed, AED; Mary Lung'aho, LINKAGES; Elisabeth Kvitashvilli, OFDA, *personal communication.*

important as biscuits that break down readily can be crumbled into porridge or given to infants over six months.[56]

- Mainstay bars have been called the 'fruitcake of emergencies" and have encountered limited success in the field. In Albania, Mainstay bars were provided during the refugee exodus. The main complaints were that they made people thirsty and were 'foreign'. There was substantial wastage. They were distributed in camps because they proved "too heavy" to airdrop. Mainstay bars were also used in the Balkans to provide a supplementary food source. The bars were wasted, partly due to the fact that the camps were flooded with foods that were preferred. [57]

- UNHCR described BP5 and HEBs as "highly useful" and often the only thing available to offer people on the move. UNHCR maintains stock of HEBs for contingency planning purposes. In 1996 during the mass return of Rwandan refugees, HEBs were distributed to people on the road and it was the main food that people had during their long journey back home.[58]

- Humanitarian Daily Rations while useful in some situations, are not very cost effective and are often culturally and socially unacceptable. They are not suitable for small children. There are several examples of considerable wastage in the Balkans. [59]

- The value of compact foods in situations where fuel and water is scarce was emphasized. In Sarajevo, the International Rescue Committee (IRC) found that a large consignment of donated pop-tarts were surprisingly useful. While skeptical of the nutritional content and commercial packaging, IRC were surprised to find that they became a valued commodity among the local population for the following reasons: They were well packaged, could withstand transport and did not need to be cooked. For the very many people without electricity or other forms of energy camping out in dark and dank collective centers, they were easy to use and tasted great. Mothers were particularly grateful to give their children something sweet and brightly packaged.[60]

TIMING AND ACCESS CONSIDERATIONS

There is a critical niche for compact foods during the initial stages of a crisis. When compact foods are used to provide a complete diet to affected populations in the initial stages of a crisis, it is critical that they can be delivered on a timely basis (within 48 hours). There is no consensus on how long compact foods should be eaten as a sole food source. While the planning figure of 15 days for the EFP is reasonable, it is unlikely to be rigidly adhered to in practice. Once a food pipeline is fully established, the EFP can transition out.

At each stage of an international relief operation, multiple interventions may be appropriate, each complementing the other. During the early stages of an emergency, access is a key factor that

[56] Helen Young, Tufts, *personal communication.*
[57] Susan Bradley, USAID, Food for Peace, *personal communication.*
[58] Zara Mirghani, UNHCR, *personal communication.*
[59] Lola Gostelow, SCF/UK; Susan Bradley, USAID/Food for Peace, *personal communication.*
[60] John Fawcett and Victor Tanner, *personal communication.*

affects decisions about which food is brought in. As noted earlier, the delivery of food to uprooted and vulnerable populations is often fraught with problems. Insecurity is a key factor and access may have to be carefully negotiated. Prior to establishing a stable food pipeline, food commodities may be brought in at high transport expense (airlift, using regional food stacks, and delivered by airdrops, village drops, or other un-targeted forms of distribution). WFP stipulates that a full food basket should be established as soon as possible and states that in some situations they have mobilized food to the population through borrowings and ship diversions before HEBs arrive (as in the case of Rwanda).[61] In many situations this is not the case and the establishment of a food distribution takes much longer than a week or two.

Given the niche for compact foods in the first phase of an operation, it is crucial that they be stockpiled regionally and that they can be delivered within 24-48 hours, perhaps requiring regional stockpiling. Delay in the delivery of the compact foods may result in missing the "critical niche." Delay in the arrival of compact foods may give rise to considerable wastage if the food pipeline is established before the compact foods arrive (WFP Rwanda), and/or the necessity to distribute them anyway (as in Kosovo). Left over compact foods may be shifted somewhere else, whether really needed or not. WFP sent large quantities of Mainstay from Kosovo to Timor (where they were disliked just as much!). Of course this ripple effect of failing to meet critical food needs with the right product at the right time has significant cost repercussions.

Most importantly if delivery of compact foods is not timely, recipient populations may not receive an adequate, suitable food when they most need it. This has been noted earlier, but it is important to emphasize that the typical WFP general ration is designed for a "healthy" population, not for the malnourished. Thus if there is a delay of several weeks in establishing a general ration distribution (as is often the case), then the population will already be malnourished and the quantity and the quality of the general ration will be inadequate without the EFP to bridge the gap.

There is no consensus regarding how long compact foods should be used for. WFP recommends compact bars and HEBs can be used for up to one a week if used in the initial stages of a crisis as a stopgap ration. UNHCR suggests using them for 2-3 days, but acknowledges that in reality it may be longer than this in some circumstances. The HDRs are designed to be used for up to one month. Discussions to date regarding the EFP suggest that it could be consumed with little or no other food for up to 15 days. In practice, it may be difficult to eat sufficient amounts of a single compact food for this long. An adult would need to eat 8.5 BP5 bars a day to meet the energy requirement of 2100kcal. Reliance on a single compact food for much longer than a week may result in the food being traded, sold or discarded. As noted earlier, while trading is a perfectly acceptable coping mechanism, from the donor viewpoint, the wide-scale use of compact foods as an economic resource is not very cost effective. Once the pipeline begins to be established, EFPs can transition out. This will allow recipients the option to eat the EFP while they become established and begin to adapt to their situation and a relief diet.

[61] Anne Canallan, WFP, *personal communication.*

FUEL AND WATER CONSIDERATIONS

Compact foods may be particularly useful in meeting the food needs of emergency affected populations with very limited access to fuel and water. EFP packaging may be designed for re-use as storage containers and for carrying water. Some existing compact foods require considerable amounts of drinking water in order to digest them. It is important to ensure the right moisture balance in the EFP so that the product is not thirst provoking, but does not impact on shelf life.

Fuel and water are important considerations. Minimum water needs vary with each situation but increase markedly with raised air temperature and physical activity. As a standard requirement, approximately 15-20 liters are required per person per day. For drinking purposes a minimum of 3 liters is required, 2-3 liters for food preparation, 6-7 liters for personal hygiene and 4-6 for laundry.[62] Compact rations cannot be eaten without water. Compact foods that contain little moisture such as BP5 and Mainstay have been found to be particularly thirst provoking. The manufacturers of BP5 recommend a minimum of 150ml (a cup) of water for each bar (approx 1.5 liters for 8.5 bars). Striking the right balance in terms of moisture content in the EFP is important. BP5 contains very little water (4%) and is considered to be too dry and thirst provoking. On the other hand the moisture content should not affect the shelf life. In trials for the Oxfam biscuit in the 1980s, results revealed that the acceptability of the biscuits was affected by the quantity of water in the formulation. The formulations that contained 40g of water or less were significantly more acceptable.

A family cooking on a wood stove requires 5 kg of wood per day. As noted earlier there are many examples of recipients of food assistance selling part of their rations to purchase firewood. If adequate fuel is not provided, then the gathering of firewood can contribute to deforestation in a spectacular way as well as being time and energy consuming for the population. Thus the provision of a ready to eat food not only has nutritional benefits, but environmental benefits as well as implications for care and feeding of small children. Considerable amount of the time of caretakers can be taken up securing fuel and water in emergencies. In considering the packaging for the EFP, it would be advantageous to provide containers that can be re-used for storage or for carrying water. Such containers are almost always in desperately short supply in the initial stages of an emergency.

A contaminated environment is a leading factor in contributing to infections in emergencies, particularly diarrheal diseases. While issues pertaining to the supply of clean water in the initial stages of an emergency are beyond the scope of this discussion, it is important once again to emphasize the critical value of delivering a complete food in the initial stages of a crisis. Infection and epidemic illness is a leading cause of death in the initial stages of an emergency often occurring in a nutritionally vulnerable population. Given the very critical needs for clean water in the initial stages of an emergency, some have suggested including water with the compact ration or iodine tablets at a minimum.

[62] OFDA, *Field Operations Guide*, (Version 3.0) (USAID: 1998).

PACKAGING CONSIDERATIONS

The EFP may need to be made available in a variety of packages intended for different purposes. Specifically there is a need for packaging suitable for dropping from high altitudes such as the WFP flutter pack. The long shelf-life product would primarily be used for stockpiling. Procurement officers should be able to specify the packaging for different operations. The packing and shape of the compact food may impact on whether it is diverted. Foods in small boxes or space age packaging are more prone to diversion and can be environmentally damaging. Outer packaging in lightweight rigid containers means the contents are less likely to be diverted and the containers can be re-used. Inner packaging must be easy to open without tools.

The spoilage potential of biscuits is dictated by the quality of packaging, which should be able to withstand the abusive conditions of transport and storage common in emergencies, thus reducing losses due to mold, insects, rodents and other pests.

WFP states that HEBs (particularly for humid areas) should be packaged with a moisture barrier to prevent an increase in moisture content and subsequent deterioration. A sturdy outer package (cardboard, carton or tin) is required to resist breakage. Because of the high fat content of biscuits, light proof and airtight packaging is required to avoid rancidity.

Sub-packing HEBs in tins has proven to be very effective. OXFAM packed biscuits in both tins and tough plastic containers. Not only did this extend the shelf life, but also the containers were very useful for the recipients to carry water and store food and other items. Containers with a tight seal such as the tins currently used to pack biscuits by WFP were found to be highly valued as storage containers in Africa. Lack of storage containers can limit the population's access to water, which contributes to rising morbidity and mortality statistics in relief situations.[63] Packing HEBs in tins extends the shelf life to five years. The larger unit size (10kg) also makes them less attractive to armed forces and to diversion. Tins should be of good quality and have lids that are easy to open. They should be lightweight, yet strong and rigid enough to survive air drops and transport. Given that it is important to preposition compact rations, it is important to take steps to extend the shelf life and preserve the quality of the product. The manufacturers of BP5 and Mainstay and some HEBs packed in tins note that their products have a shelf life of five years unconditionally with a minor decrease in some vitamins.

One of the reasons for the higher cost of BP5, Mainstay 3600 and the HDR products is the packaging. Vacuum packaging or controlled atmospheric packaging (nitrogen or CO2) is very expensive and probably not justified given that it cannot be re-used, creates litter, is not biodegradable and thus may become an environmental hazard.[64]

Biscuits are usually air dropped tied to pallets like other commodities. The outer packaging must withstand being dropped 4 meters onto a hard surface without bursting or spilling. Regular airdrops require low level flying which is not always possible in insecure areas where anti aircraft guns make low level flying too dangerous. In order to address this, WFP has designed a package for HEBs that can be dropped from high altitudes. The package is known as a 'snow

[63] H. Young and S. Jaspars, "Nutrition, Disease and Death in Times of Famine," *Disasters* 19:2 (1995): 104.
[64] C. Triplehorn, "One Man's Trash is Another Man's Treasure: An Analysis of the Social, Political, Environmental and Economic Impact of Food Packaging in Relief Situations," *Unpublished Thesis* (Tufts University: 1999).

drop' or a 'flutter pack' and consists of a long strip of plastic with a pouch on either end. One end of the pouch has weighting of 100g of biscuits, the other end of the pouch has a weighting of 75g. The package of biscuits rotate as they come down which slows the speed of descent and makes it safer in populated areas.

Field experience suggests that inner packing should be in small units (not more than one meal e.g. 150-250g/per person) and possibly individually wrapped to suit the requirements of all age groups. While small containers are useful to handle distribute and carry, they are also susceptible to damage and stealing during transport, storage and handling. Thus sub-packaging in larger tins is advisable.

The color, style and type of packaging are a subject of debate. One school of thought proposes that the inner packaging or small box unit should be bright and cheerful and attractive to adults and children. The other school of thought suggests that the packaging should look 'medicinal' rather like the current BP5 box, thus making it less prone to diversion.

LABELING CONSIDERATIONS

The EFP must be well labeled on the inner and outer packaging, preferably using the metric system. Directions for use of the EFP in pictographs is critical. Guidelines for program managers should be included in the outer packaging.

All imported foods should arrive in packaging that is clearly labeled in an appropriate language. Both the inner and outer packages should be labeled. Current compact food products are not well labeled and often lack information critical to program managers and the intended recipients. The list in Box 5 includes key information found to be essential for procurement officers, logisticians and program managers in the field. It results from discussions with biscuit manufacturers, field staff and those who have been involved in the review and design of products. US manufacturers must be advised to use the metric systems for weights and measures instead of or as well as the English system in accordance with international practice. Failure to do this will result in considerable confusion in the field. The outer packaging case should include guidelines and directions for program mangers. The inner packaging should include instructions in pictographs for the recipients.

BOX 5: **Suggested Labeling for a Compact Food**

- The name of the product
- Intended use of the product
- Country of origin
- Manufacturers name
- Manufacturers address, fax and telephone number
- Date of manufacture
- 'Better used by' date and expected shelf life
- Batch number
- Storage instructions for the UNOPENED PACKAGE
- Storage instructions for the OPENED PACKAGE
- List of ingredients
- Detailed composition with nutrients expressed per 100g and per 100 kcal, compounds for fortification and amount of additives
- Directions for use in pictograms

COST CONSIDERATIONS

The cost of the EFP should be considered in terms of kcal delivered. This gives advantage to more nutrient dense products. An energy/nutrient dense high-energy biscuit is cost effective.

Costs per unit and per nutrient vary for various biscuits, bars and HDRs. Cost comparisons are shown in Box 6. Costs quoted do not include transport. As a rule of thumb, the transport costs usually double the prices and more if it is airlifted.

Units cost may be dependent on the scale of procurement. A competitive market may lower prices. Wherever possible, food and other relief items should be procured within country by purchasing and transporting surpluses from unaffected areas. This reduces overhead costs and can partially compensate for the losses caused to the country's economy by the disaster. It has been suggested that high-energy biscuits, canned meats, peanuts, dried fruit and other alternatives could be either locally or regionally procured or prepackaged for further distribution. Such food packs would certainly be more cost effective as well as more palatable and culturally acceptable. Vendors could be mobilized in food secure areas to prepare local nutritious snacks. These could be packed or sold at camps through a monetization program. Imported compact foods could be used as the first line commodity while other foods are being procured and assembled.[65]

Energy dense foods by definition contain a high amount of energy for a relatively small volume. This includes items such as oil, but high-energy biscuits and BP5 type food bars contain a high amount of energy for small volume and thus costs are relative. Biscuits have high nutritional value and are energy dense and cost effective. BP5 is about three times more expensive than

[65] Lola Gostelow, SCF/UK, *personal communication.*

biscuits, which again are approximately three times the price of blended food. Perhaps the key advantage of compact foods over traditional bagged commodities is the energy density for weight and size. Energy density will affect ration sizes and volume eaten as well as influence distribution (shipping, ground transport and air dropping) and storage costs. The availability of trucks and storage facilities is limited in emergencies and the space required for energy-dense biscuits is much less than bagged commodities.

Packaging, quality and price of the ingredients used determine the overall result when using a specific product (energy density and micronutrient availability). Logistical considerations must also be factored in when analyzing products' cost efficiency. For instance, a typical container will hold some 9 metric tons of F100 therapeutic mix, while the same container may hold more than 18 metric tons of BP100 with nutritional specifications very similar to the F100. Last and not least, cost value is determined by whether the product is actually eaten and in sufficient quantities by the targeted recipients.

Box 6 : **Cost Comparisons (prices in US $)**

Food Item(s)	**Cost/ MT US$**	**Cost/beneficiary/2100kcal**
BP5	3,565	1.63
HEBs	1,200 (in tins)	0.55
HDRs	2,194	3.95
CSB	350	0.18
Basic ration	200-300	0.14-0.16

Note: Basic ration includes 440g of cereal, 50g pulses and 40g oil

CONSIDERING INFANTS AND YOUNG CHILDREN

Some existing compact foods are not suitable for infants under 12 months. Evidence suggests that a bar or cookie that that is easy to hold and suck and that can be crumbled in water is most suitable for children over 6 months.

The single most important factor in predisposing children to high mortality in the acute stages of an emergency is an inadequate ration. The goal is to ensure that the nutritional and psychological needs of infants and young children and their caregivers in emergency affected populations are addressed in such a way to reduce the risk of mortality and morbidity. Increased mortality and morbidity may be as much as 20 times higher than normal. This is partly the result of increased exposure to infections, but also in large measure due to the inadequate feeding of infants. To ensure nutritional adequacy, acceptability and palatability, infants and young children must receive appropriate food. Caretakers should be given access to appropriate ingredients or foods with which to provide or prepare nutrient-dense foods for older infants and young children.

Because care-giving capacity is reduced during emergencies and ability to cope is diminished by physical and mental stress, it is crucial to strengthen care-giving capacity to promote good

feeding practices for infants and children.[66] Promoting and facilitating breastfeeding particularly during upheaval and in the initial stages of an emergency when clean water and fuel may be in very limited supply is crucial. Exclusive breastfeeding is recommended for six months. It is the best compact food, a complete nutritious food with no risk of contamination. All efforts must be made to keep families together, to promote breast-feeding and to aid mothers and care takers in the feeding of their small children. In communities where a 'bottle feeding culture' has taken root prior to the onset of a crisis, it is extremely important to protect and support breastfeeding under emergency conditions.[67] Of equal and often understated importance is the importance of protecting the nutritional status of breast-feeding mothers. While the ability to breastfeed is robust even in the face of constraints such as reduced maternal dietary intake and psychological stress, there is evidence to suggest nutrient deficiencies in the mother impact on the quality of breastmilk. More research and documentation is needed in this area. However, ensuring a complete food is given in sufficient quantity to pregnant and lactating women during the initial stages of an emergency may be critical in alleviating the very high mortality rates in babies less than 6 months witnessed in many emergency settings.[68]

Some compact foods are more suitable for infants and small children than others. Plumpy' food, while tasty and nutritious, can only be used for children over 12 months. Mainstay is highly flavored and is in a form that makes it difficult for children to hold. Much of the contents of the HDRs are not suitable for infants under 12 months. BP5 and HEBs can be very useful in the feeding of young children in emergencies. They can be used as a snack, or crumbled to porridge, used to encourage appetite and to break the monotony of a relief diet.

The nutritional needs of children six months and above are linked to how much breast milk they receive. Breastfed infants aged 6- 8 months require an additional 280 kcal, infants 9-11 months require an additional 450kcal and young children aged 12-23 months require an additional 750kcal.[69] Children above 6 months can suck on a compressed food bar or HEB. In many cases this may be necessary and preferred when water is limited and the risk of contamination is high. As soon as the product is mixed with water or milk and is left for more than three hours, the risk of contamination increases. If the product is to be mixed with water, then cups may need to be provided to facilitate the feeding of infants and young children. Breastfed infants will require between 3-4 HEBs a day (1-2 BP5) or equivalent.[70]

In considering the configuration for the EFP, the needs of young children must be considered as well as ensuring ease of use for the caretaker. Field experience suggests that the EFP should be easy to hold for small fingers. It should crumble to porridge, but not be so crumbly that it disintegrates while being eaten. Each biscuit or bar might be individually wrapped for ease of use. It should be sweet (sugar only, no flavors).

[66] WHO, "Guiding Principles for Feeding Infants and Young Children in Emergencies," Annex 6 in *Management of Nutrition in Major Emergencies*, (WHO: 2000).
[67] Emergency Nutrition Network, "Infant Feeding in Emergencies," *Report of the Ad Hoc Group on Infant Feeding in Emergencies*, (ENN: 1999).
[68] Mike Golden, *personal communication.*
[69] WHO, *Complementary Feeding of Young Children in Developing Countries*, (1998).
[70] Infants are defined as children less than 12 months and young children as between 12 and 24 months.

Given the fact that some existing products can be completely dissolved in water or milk, great caution needs to be exercised in how the EFP is used and labeled in accordance with the 1981 WHO International Code on the Marketing of Breastmilk Substitutes. [71]

INFORMING THE POPULATION

Field experience has shown that in unsupervised general feeding, the recipient population and particularly the caretakers of young children must be informed about how to use the compact food. Effective labeling with pictographs is therefore important.

In all situations of food shortage, it is important keep the population informed. If the population knows that they will receive one type of food for a period of time, they may be able to plan for this and to develop alternative ways of gaining access to foods. Resentment and violence is less likely to occur if the population knows what is happening. The beneficiaries may be able to provide invaluable perspectives on which targeting strategies are most acceptable. Lessons from the field have demonstrated that it is crucial to inform and educate the recipient population on how to use compact rations particularly for small children. The Sphere Guidelines note that:

> "*Where the food basket contains unfamiliar commodities, instructions on preparation (must) be provided to households to maximize acceptance and minimize nutrient loss."* [72]

CULTURAL CONSIDERATIONS

The EFP must contain no animal fat from meat or pork, blood or by-products. Taste and texture are important. A neutral tasting product has been found to be most acceptable in trials and in the field. Sugar may be the only addition required. Oats or wheat is the preferred cereal base and are nutritionally superior to corn. Milk products can be used in the EFP with some caution.

In addition to ensuring that food is of good quality, preferences and preparation systems need to be taken into account. In informing the population, sensitivity to cultural norms and beliefs is essential. In practice, insufficient attention has been given to addressing cultural appropriateness of relief foods, yet evidence suggests abrupt changes from a cultural diet to a relief diet may lead to significant mental trauma particularly for caretakers of small children.[73] The Sphere guidelines state that:

"Foods distributed do not conflict with the religious or cultural traditions of the recipient of host populations, this includes any food taboos for pregnant or breastfeeding women and that people are consulted on the acceptability and appropriateness of the foods being distributed and the results fed into program decisions."[74]

[71] Includes any food being marketed or otherwise represented as a partial or total replacement for breastmilk, whether or not suitable for that purpose (Article 3, International Code of Marketing of Breastmilk Substitutes, WHO, 1981). This includes infant formula, follow on milks, teas, juices, water and other foods when marketed as breastmilk substitutes.
[72] Sphere Project, *Minimum Standards in Nutrition*, (2000).
[73] D. Keen, *Refugees: Rationing the Right to Live*. (Zed books, London: 1992).
[74] Sphere Project, *Minimum Standards in Nutrition, (*2000).

WFP/UNHCR Guidelines note that:

> "*The staple food should be culturally acceptable. Emergency situations are not the time to introduce a new food*."[75]

The EFP should not contain any fat from meat or animal by-products such as gelatin.[76] Cultural taboos against certain food such as eggs don't come into play in the context of an EFP. For example, while whole eggs are taboo for pregnant women in Ethiopia, when they are mixed into a cookie or cake this is not an issue. Indeed HEBs have been widely used in Ethiopia with no problem. Wheat and oats are universally acceptable as the base for baked products. Oats are highly preferable from a nutritional point of view and experience with oat based relief foods in feeding programs has been very positive. Corn is less favored from a nutritional perspective. There is some concern regarding the use of milk products and peanuts due to intolerance or allergies. However, the proportion of the population affected by clinically significant milk intolerance and severe peanut allergy and gluten intolerance is very small.[77] Dried skim milk is currently widely used in the treatment of severe malnutrition of adults and children and in compact foods such as BP100.[78]

In terms of taste and acceptance, WFP and NGO experience suggests that sugar need be the only addition. In trials proceeding the design of the Oxfam UK biscuit in the 1980's, the formulations which contained sugar and no egg were found to be significantly more acceptable among adults and children than other formulations.[79] Artificial colorings should be avoided. Products such as Mainstay, which contain flavorings and colorings, have been found to be less acceptable than neutral tasting products. [80] In general additives, flavorings, antioxidants, emulsifying agents, anti-caking agents and pH-adjusting agents should be within the specifications of the Codex Alimentarius for cereal based products suitable for infant and children. The same applies to contaminants and aflotoxin level.

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[75] WFP/UNHCR, *Joint Guidelines for Estimating Food and Nutritional Needs in Emergencies, (*1999).
[76] Charges of insensitivity were aimed at the Pentagon when it was discovered that HDRs sent to the Muslim enclaves in 1993 contained gelatin.
[77] The American College of Allergy and Asthma Immunology states that less than 2% of the US population have clinical significant food allergies.
[78] The nutritional advantages of certain cereals and lactose absorption rates in malnutrition are referred to in the paper by Michael Golden.
[79] H. Young, et al., "Development of a High Energy Biscuit for Use as a Food Supplement in Disaster Relief." *Journal of Food Technology* 20 (1985): 689-695.
[80] Mainstay bars contain Tartrazine, which is not recommended by UNICEF for malnourished populations who may be more sensitive to this.

5 SUMMARY OF CONCLUSIONS

1. There is a "critical niche" for compact foods during the initial stage of a crisis, particularly when people are on the move (period of flight and/or returning home). They can be very useful as a "stop gap" general ration before the food basket is established, where populations have very little access to water and cooking fuel and may be particularly useful in insecure areas.

2. When compact foods are used as "stop gap" rations during the initial stages of a crisis, it is critical that they arrive on a timely basis, that is within 48 hours. Delay in the arrival of compact foods has been found to give rise to considerable wastage if the pipeline is established before the compact food arrives. On the other hand, if (as is often the case), there is a delay of several weeks in establishing a pipeline, the affected population will become malnourished and deficiencies may arise. The quality and quantity of the typical general ration will be inadequate to correct these deficiencies and achieve 'catch up' potentially giving rise to the need for costly targeted interventions. Thus the timely arrival of the EFP can bridge a critical gap.

3. The recommended length of time compact foods should be eaten as a sole food source ranges from 2-3 days to up to 30 days. Anecdotal evidence and field experience suggest that a planning period of 15 days is reasonable, but in practice this is unlikely to be rigidly adhered to. Compact foods should transition out after the food basket becomes established and recipients adapt to their situations.

4. Despite the fact that the planning figure for emergency rations of 2100kcal per day is widely accepted, there is still some discrepancy regarding the minimum energy requirements for this "critical period". Some agencies still persist in using 1500kcal in exceptional conditions as a maintenance figure. Current recommendations from the manufacturers of BP5 and other compact foods use this figure in recommending how much of the product to provide in a general ration. Clearly this is in contrast to evidence that suggests people in the initial stages of an emergency have higher energy and nutrient requirements.

5. There is ample argument for the EFP to be a complete wholesome food that contains all the essential nutrients necessary for health in sufficient amounts to meet the entire needs of all individuals within the recipient population. A complete food may help prevent the onset of nutritional deficiencies and ameliorate outbreaks of epidemic illness.

6. Compact foods are widely used in selective feeding programs. They are used as an energy dense supplement and are a highly effective means of delivering nutrients to people outside of formal programs (at night, as take home ration, or to people who refuse to come to feeding centers). Thus there are other uses for the EFP beyond the critical niche during the initial stages of an emergency. Aside from its use as a take home ration, it may also be effective for diet diversification and as a micronutrient vehicle in some circumstances.

7. Compact foods can be culturally unfamiliar and at times have proven to be inappropriate. Available information and a body of anecdotal evidence suggests that the most accepted (among both adults and children) and cost effective type of compact food in both a general ration and in feeding programs is a high energy biscuit with little or no flavorings except sugar. HEBs are also cost effective with a high energy density and substantially less expensive than BP5, Mainstay and HDRs. The preferred cereal base from a cultural and nutritional perspective is oats or wheat. Dried skim milk may also be added with some caution.

8. The needs of infants and young children and their caretakers are critical when considering the use of compact foods. Some existing compact foods are not suitable for infants under 12 months. Evidence suggests that a bar or biscuit that is easy to hold and suck and that can be crumbled in water is most suitable for children over six months. Field experience has shown that in unsupervised general feeding, the recipient population and particularly the caretakers of infants must be informed about how to use the compact food. Effective labeling with pictographs is therefore important.

9. The risk of diversion and theft of compact foods is a great and real concern. Evidence suggests that the packing and type of the compact food impacts on whether it is diverted. Compact foods in small unit boxes such as BP5 or space age packaging (such as HDRs and Mainstay bars) are more prone to diversion. Lessons from the field suggest that HEBs in cylindrical or square packaging are less likely to be diverted. Outer packaging in lightweight rigid tins extends shelf life and the larger unit is also less likely to be diverted. The tin or plastic containers can also be re-used for storage and for carrying water.

10. Experience has shown that compact foods are often needed in insecure remote areas. WFP has found that it is necessary to adapt the packaging of HEBs to respond to these types of scenarios. Space age packaging has not only proven to be an environmental hazard, but is costly and more prone to diversion. Several types of packaging are thus required for a compact food so that it is suitable and readily available for different situations.

11. There is confusion regarding the range of products and when and where to use them (and when not to). Current guidelines are contradictory thus exacerbating the confusion. Few guidelines on the uses of compact food inform the reader what to do in the initial stages of an emergency or where water or fuel supplies are limited or unavailable. However it is beyond the scope of this paper and the role of the committee to define this guidance at this stage.

6 KEY RECOMMENDATIONS

1. The EFP should be deliverable within 48 hours of a crisis. This will probably require regional stockpiling.

2. The period of time during which the EFP can be eaten as a sole food should be defined. Fifteen days may be specified, while bearing in mind that this is unlikely to be rigidly followed in practice.

3. The EFP should be a complete wholesome food containing all the essential nutrients necessary for health in sufficient quantities to meet the needs of all individuals within the recipient population.

4. In order to be cost-effective, the EFP should be very energy dense at least 500kcal/100g. Sugar should be added to increase energy and add taste. No flavors or colors are necessary. Moisture content should be such that it does not affect shelf life but also does not induce thirst.

5. The EFP should be made available in a variety of packages suitable for different situations. Specifically, appropriate packaging must be designed for air-dropping from high altitudes and stockpiling for long periods.

6. The EFP should be packed in such a way as to minimize the possibility of diversion and maximize the shelf life. Space age packaging should be avoided. Outer packaging should be rigid, but easy to open without tools, re-sealable and preferably re-useable as storage and water containers.

7. Both the inner and outer packaging must be well labeled and directions for use provided to program managers and the recipient population. The use of pictographs on the inner packaging is essential.

8. Configuration should be in small individual units that are easy to hold.

9. The EFP must be suitable for infants and young children. The EFP should be of the right texture such that it can be crumbled to porridge and be held and sucked by small children without falling apart.

10. The EFP must be culturally acceptable and edible. It must be contain no animal fat from meat, blood products or animal by-products such as gelatin. Oats or wheat is recommended as a cereal base. Dried skim milk may be included with some caution. The EFP must be field tested for acceptability.

ANNEX 1

TABLE I

A COMPARISON OF COMMERCIALLY AVAILABLE ENERGY BARS

TABLE I: COMPARISON OF COMMERCIALLY AVAILABLE ENERGY BARS/100g[81]

Nutrient	Unit	Ref Reqs	High Carb Bars[82]	40/30/30 bars[83]	High protein bars[84]	Supplement bars[85]	For Comparison	
			Clif Bar Clifbar Inc.	**Balance** Balance bar Co.	**Protein Plus** Power bar Inc.	**Odwalla** Odwalla Inc.	**Nutri-Grain** Kelloggs	**HOOAH** US Army
Kcal		2100	323	400	320	370	378	406.5
Cost US $/bar/100g	$/kcal		1.39/2.08	0.99/1.98	2.19/2.84	1.29/2.06	0.37/92.5	unknown
Weight of one bar			68g (1.5 bars/100g)	50g (2 bars/100g)	78g (1.3 bars/100g)	62g (1.6bars/100g)	37g (2.5 bars/100g)	65g (1.5 bars/100g)
Protein	g	52-63	11.7	28	31.2	26	5.4	5.4
Fat	g	40	3.6	12	6.5	6.4	8.1	12
Vitamin A	IU	1600	2205	5000	0.0	4000	2027	0.0
Vitamin C	mg	28	88	120	78	96	0.0	40.65
Thiamine (B1)	mg	0.9	0.55	1.2	1.95	0.6	1.0	0.45
Riboflavin (B2)	mg	1.4	0.3	1.0	2.21	0.6	1.14	0.51
Niacin	mg	12	4.4	16	26	8	13.5	8.1
Vitamin B6	mg	2	0.5	1.6	2.6	0.8	1.35	0.6
Vitamin B12	mcg	6	1.35	0.24	7.8	2.4	0.0	1.8
Vitamin D	mcg	3.8	0.0	0.0	0.0	1.5	0.0	0.0
Folic acid	mg	160	118	160	520	640	108	300
Pantothenic acid	mg	10	1.4	4	13	4.0	0.0	0.0
Calcium	mg	500	441	160	520	64	540	63
Iron	mg	22	6.6	7.2	8.1	2.88	5	1.14
Phosphorous	mg	1470	441	294	455	0.0	108	118.5
Magnesium	mg	630	176	80	156	0.0	21.6	48
Zinc	mg	18.9	4.4	6	6.8	0.0	4	0.6
Potassium	mg	3990	420	180	0.0	0.0	0.0	192
Sodium	mg	1260	135	440	156	88	297	99
Copper	mcg	1995	73	1197	907	0.0	0.0	0.0
Selenium	mcg	75.6	27.7	22.6	0.0	Trace not listed	0.0	0.0
Manganese	umol	6.3	4	1.89	0.0	0.0	0.0	0.0
Chromium	nmol	42	12.3	5.0	0.0	Trace not listed	0.0	0.0
Molybdenum	nmol	105	23	12.6	0.0	0.0	0.0	0.0
Iodine	mcg	150	33	0.0	0.0	0.0	0.0	0.0

[81] Values based on daily values for a 2000 calorie diet and are subject of information provided on labels by manufacturers
[82] High carbohydrate, low fat bars consist mainly of high fructose corn syrup and grape and pear juice concentrate with added vitamins and minerals. Oats, nuts and fruit may be added.
[83] 40-30-30 indicates the ratio of carbohydrates to protein to fat. Balance bars are energy dense.
[84] High protein bars are aimed at body builders.
[85] Supplement bars are energy and nutrient bars claiming to “boost energy”.

ANNEX 2

TABLE II

EXISTING COMPACT FOOD PRODUCTS USED IN EMERGENCIES: AT A GLANCE COMPARISON

TABLE II: EXISTING COMPACT FOOD PRODUCTS USED IN EMERGENCIES: AT A GLANCE COMPARISON

PRODUCT NAME	MADE BY	SHELF LIFE	PACKING	CONFIGURATION	KCAL/ 100G	COST $/MT	RECOMMENDED USE	ADVANTAGES/DISADVANTAGES
BP5 ***Compact Food***	COMPACT Norway	5 years with minor decrease in some vitamins	Packed under vacuum in air-and watertight alu-foil bag. Bag protected by water repellent cardboard box resistant to germs, insects and rodents 24 units of BP-5 packed in polyethylene coated solid board carton Pictogram explains usage	Compressed tablets of 27.8g. Each unit of BP5 (500g net)=18 tablets wrapped in 9 bars with grease-proof paper	458kcal 1900KJ	$3,565	→First phase of a relief operation for short periods where people require a compact energy source →Air-dropping in accessible areas →Take home ration in feeding programs →Repatriation operation →Preparedness stocks →As an interim supplement	✓ Needs no preparation before use ✓ Universally accepted ✓ Suitable for children > 6 months, P&L and malnourished people ✓ Widely used in field ✓ Eaten as a biscuit or porridge ✓ Robust packaging ✖ Thirst provoking, too dry ✖ High satiety value ✖ Difficult to open ✖ Attractive as combat ration
BP100 MedicFood	COMPACT	2 years from DOP with minor decrease in some vitamins	As above	Compressed tablets of 28.4g As above	527kcal 2205KJ	$3,076	→Designed for use in the treatment of severely malnourished children>12 months, adolescents and adults in the rehabilitation phase	✓ Useful in contaminated environments and when TFC's cannot be established. ✓ Acceptable to all cultures ✖ Not to be used as a general ration
Mainstay 3600 Compact food	Survivor Industries US	5 years	Pouch heat sealed under vacuum	Nine pieces in a cohesive bar	517kcal	$3,400	→For use in specific situations where BP5 is considered appropriate	✓ Needs no preparation before use ✖ Concerns re nutritional composition and use of additives ✖ Discarded by recipients in field ✖ Packaging difficult to dispose of ✖ Attractive as combat ration
High Energy Biscuits (various names)	WFP* BISCA Denmark House of Manji Nairobi UNICEF Oxfam UK	Average 18 months. 5 years packed in metal tins	Moisture barrier and outer container (cardboard, plastic or tin). Biscuits with high fat content need light-proof, airtight packs to avoid rancidity. Can be foil wrapped in packs of 200-250g. Weighted plastic "snowdrop" for airdrops at high altitude	Square or round conventional biscuit/cookie. Number/pack varies	450kcal	$1,000 + $200 in metal tins $1,500 for snow drop	→Emergency rations in the first few days of a crisis →Carried during transit →Use in feeding programs for night feeds, take home supplements and encouraging appetite →Air-dropping in inaccessible locations	✓ Widely acceptable ✓ Needs no preparation before use ✓ Less prone to diversion that compact foods (depending on type/location) ✓ Environmentally appropriate packaging and reusable containers
Plumpy Food	Nutriset France	12 months	Vacuum packed in foil wrappers.	Individual sachets	545kcal	$3,976	→Complement to a bread-based ration →For use in emergencies where cooking is difficult	✓ No preparation necessary ✓ High energy density ✖ Contains peanut butter ✖ Not generic enough for wide-scale use
HDRs	Dept of Defense USA	2-5 years	Tough plastic waterproof bag. Food contained in individual vacuum sealed packets	Contains 2 entrees, five comp products	N/A Approx. 2000kcal ration	$2,194	→Designed to meet the nutritional needs civilians In emergencies	✓ Contains no animal products ✖ Difficult to open without a knife ✖ Unfamiliar to many emergency affected populations ✖ Not suitable for small children ✖ Packaging difficult to dispose of

ANNEX 3

TABLE III

NUTRITIONAL AND COST COMPARISON OF SELECTED COMPACT AND BLENDED FOODS

TABLE III: NUTRITIONAL AND COST COMPARISON OF SELECTED COMPACT FOODS AND BLENDED FOODS

Nutrient	Unit	Ref Reqs	HDRs MOD	BP5 Compact		MAINSTAY Survivor Industries		HEB Various		PLUMPY FOOD Nutriset		CSB USAID	
		RDAs[86]	Ration	100g	2100	100g	2100	100g	2100	100g	2100	100g	21
Kcal		2100	2100*	458	460g	517	460	450	460g	545	400g	380	550g
Cost [87]	$/kcal		3.95		1.63		1.36		0.55		1.28	0.035	0.19
Amount eaten/2100kcal[88]	Bar		1 ration	1.8bars	8.5 bars	1.3 bars	5.3 bars	3.6biscuits	17 biscuits	1sachet	4 sachets	1 meal	5 meals
Protein	g	52-63g	45-50	14.7	67.6	3.94	15.7	12	55.2	54*	216	17.2	94.6
Fat	g	40g	38	17	78.2	30.26	121	20	92	50*	200	6.9	38
Vitamin A	IU	1600	2500	1567	7208	3422	13,688	1250	5750	1980	7980	2612	14,366
Vitamin C	mg	28	41	40	184	47.0	188	30	138	125	500	40.1	220.5
Thiamine (B1)	mg	0.9	1.5	0.52	2.4	0.34	1.36	0.75	3.45	3.5	14	0.53	2.9
Riboflavin (B2)	mg	1.4	1.7	0.52	2.4	0.58	2.32	1.1	5.06	2	8	0.48	2.64
Niacin	mg	12	20	6.5	29.9	7.75	31	12	55.2	22	88	6.23	34.2
Vitamin B6	mg	2	2.8	0.87	4.0	2.41	9.64	1.5	6.9	2	8	0.5	2.75
Vitamin B12	mcg	0.9	1.25	0.9	4.1	1.5	6	0.75	3.45	2	8	1	5.5
Vitamin D	mcg	3.8	10	4.3	19.7	6.7	26.9	5	23	10	40	198 IU	1089
Vitamin E	mg		11.2	3.5	16.1	0.0	0.0	7.5	34.5	20	80	8.7	47.85
Folic acid	mcg	160	400	130	598	169	676	120	552	500	2000	300	1650
Pantothenic acid	mg	10		2.2	10	12.3	49.2	4.5	20.7	6	24	3.4	18.7
Calcium	mg	500	1500	600	2760	685	2740	375	1725	560	2240	831	4570
Iron [89]	mg	22	22	10	46	2.4	9.6	17	78.2	13	52	17.4	95.7
Phosphorous	mg	1470	1500	600	2760	490	1960	0.0	0.0	380	1520	206	1133
Magnesium	mg	630		60	276	149	596	150	690	160	640	173.8	955.9
Zinc	mg	18.9		10	46	0.0	0.0	8	36.8	13	52	5.0	27.5
Potassium	mg	3990		250	1150	0.0	0.0	0.0	0.0	900	3600	634	3487
Sodium	mg	1260		15	315	30.5	122	0.0	0.0	0.0	0.0	7.3	40.1
Copper	mcg	1995		200	920	0.0	0.0	0.0	0.0	1400	5600	900	4950
Selenium	mcg	75.6		0.0	0.0	0.0	0.0	0.0	0.0	255	900		
Manganese	umol	6.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	3.85
Chromium	nmol	42		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Molybdenum	nmol	105		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Iodine	mcg	150		100	460	0.0	0.0	100	460	80	320	57	313.5

* Approximately 10% protein and 60% fat

[86] Reference requirements: WFP/UNHCR, Guidelines for estimating food and nutrition needs in emergencies 1999; Management of nutrition in major emergencies, 2000 and Sphere minimum standards in nutrition, chapter 3, 1998.

[87] Cost estimates based on costs/MT provided by the manufacturer do not include shipping. Prices are subject to foreign exchange rates

[88] BP5 and Plumpy' food meet most of the recommended requirements. Mainstay is very low in protein and is lacking certain micronutrients such as Zinc and Iodine. HEBs are lacking in Copper, Selenium Manganese, Chromium and Molybdenum.

[89] Iron from a diet that provides low or very low bio-availability.

ANNEX 4

TECHNICAL REFERENCE CARDS FOR COMPACT AND BLENDED FOODS

QUICK REFERENCE TECHNICAL CARD

Product Name: **MAINSTAY 3600**
Manufactured by: Survivor Industries US
Short Description: Compact food developed for the Coast Guard and for use in emergencies
Cost US$ MT/2100: 3,400/1.36

General Description

Ready to eat compact food for use by US Coast Guard and restricted use in emergencies. Solid bars divided into nine break-off pieces. The Pouch is heat sealed under vacuum in aluminum foil laminate. Ten pouches are packed in one case.

Technical Specifications

- ❑ One pack is 3600 kcal in nine pieces but separated or wrapped individually.
- ❑ Mainstay does not meet the international requirements for macro and micronutrients. Protein levels are very low. The manufacturer has agreed to modify this to make it comparable to BP5.
- ❑ Contains Tartrazine which is not recommended for malnourished children.
- ❑ Can be dissolved in water. Concerns that it could be misused as a breast-milk substitute.

Application

- ❑ Short-term use in the first phase of a relief operation.
- ❑ During repatriation operations.

ADVANTAGES	DISADVANTAGES	CAUTIONS
▪ Needs no preparation before use ▪ Can be used as a porridge or sprinkled on other food	▪ Attractive as a combat ration ▪ Concerns regarding nutritional composition ▪ Content and instructions do not conform to international standards ▪ Discarded in the field ▪ Addition of additives and flavors make it inappropriate for some population groups ▪ Wrapping hard to dispose of	▪ Used with caution ▪ Should not be used in selective feeding programs ▪ Not for children < 6 months

QUICK REFERENCE TECHNICAL CARD

Product Name: **BP100 MEDICFOOD**
Manufactured by: Compact AS, Norway
Short Description: Compressed food for rehabilitation of severely malnourished adults and children
Cost US$ MT/2100: 3,076/1.20

General Description

Compressed food for use in the rehabilitation phase of severely malnourished children and adults. Compressed into 18 tablets of 28.4 g in 9 bars in grease-proof paper. Each package of 510 g is equivalent to one days ration. Packed in vacuum packaging in a 3-layer laminated aluminum foil bag packed in a water-repellent cardboard box. 24 boxes packed in a polyethylene-coated box carton (12.24 net). BP 100 has a minimum shelf life of two years.

Technical Specifications

- ❑ Nutritional specification is almost the same as F100 milk formula. BP100 contains iron (10mg/100g) and is therefore dangerous in the first phase of treatment of severe malnutrition. The micronutrient content in BP100 is in accordance with recommendations in the WHO manual for the treatment of severe malnutrition (WHO 1999).
- ❑ One bar/two tabs contains 300kcal. For each bar consumed, drinking water intake should be at least 0.3 liters. For children 12-24 months, BP100 should be given as porridge.
- ❑ Contains baked wheat flour, baked oat flour, vegetable oil, sugar, milk proteins, skimmed milk powder, minerals, vitamins and amino acids.
- ❑ After opening should be used within 4 weeks.
- ❑ Health certified by the Ministry of Health in Norway.

Application

- ❑ Used in the rehabilitation phase during the treatment of severe malnutrition for children >12 months and adults.
- ❑ Used in therapeutic feeding centers (TFCs).
- ❑ Useful in outpatient management in situations where TFCs cannot be established or where it is not feasible to establish TFCs.

ADVANTAGES	DISADVANTAGES	CAUTIONS
▪ Useful in contaminated environments ▪ Used where TFCs cannot be established ▪ Universally acceptable	▪ Limited use in very specific situations ▪ Requires detailed instruction in how to use the product	▪ Must not be used to replace BP5 or HEBs ▪ Not used as a general ration ▪ Never to be used for children < 6 months ▪ Porridge made from BP100 must be eaten within 3 hours

QUICK REFERENCE TECHNICAL CARD

Product Name: **BP5**
Manufactured by: Compact AS, Norway
Short Description: Compact emergency rations
Cost US$ MT/2100: 3,565/1.63

General Description

Compact food designed for use in emergencies. Contains 96% nutrition (4% water). Packed under vacuum in air and watertight aluminum foil bag and inside water-repellent cardboard box resistant to insects and rodents. Each unit box weighs 500g and contains 18 tablets wrapped in 9 bars in grease-proof paper. It has a minimum shelf life of five years. A 20 foot container can hold 18,000 kg of compact food or 36,000 units sufficient to feed 10,000 adults for approximately 5-7 days.

Technical Specifications

- Meets international reference standards for macro and micronutrient content in emergency situations.
- Contains no animal products.
- Contains baked wheat flour, hydrogenated soybean oil, sugar, soy protein concentrate, malt and added vitamins, minerals and amino acids. Use of soy protein concentrate and wheat protein secures a high "digestibility corrected amino acid score."
- Product not exposed to heat during the processing thus ensuring nutrient stability (for example vitamin A, C and certain amino acids such as Lysine).

Applications

- During the first phase of a relief operation to the whole population before the pipeline and a regular food basket has been established and it can be made available in a timely manner (48-72 hours).
- During repatriation operations.
- Targeted vulnerable groups such as children and pregnant and lactating women.
- Selective feeding programs on site and as take home rations.
- As emergency preparedness stocks.

ADVANTAGES	DISDVANTAGES	CAUTIONS
▪ Universally acceptable to all cultures and religious faiths ▪ Can be eaten directly from the pack as a cookie or crumbled on porridge ▪ Can be mixed with or sprinkled on other food ▪ Suitable for children > 6 months ▪ Robust packaging ▪ Can be air dropped as is or tied to pallets	▪ Thirst provoking ▪ Difficult to open without suitable tools ▪ Attractive as a combat ration	▪ Should not be used in tube feeding ▪ Not suitable for use in phase one of therapeutic feeding programs since it contains iron ▪ Should not be used as a sole food for more than a week

QUICK REFERENCE TECHNICAL CARD

Product Name: **CORN SOY BLEND**
Manufactured by: P.L. 480 commodity
Short Description: Bagged fortified blended food
Cost US$ MT/2100: 350/18c

General Description

Blended fortified food used in supplementary feeding programs and as a weaning food. Used in general distribution to ensure provision of suitable food for children under three and as a vehicle for micronutrient delivery. Packed in 25kg bags of multi-wall paper with three plies of paper with inner polyethylene or polypropylene plastic liner. Outer ply is treated to provide wet strength. Shelf life is a minimum of one year. CSB is a patent product produced under contract to USAID, however CSB is also used as a common name for mixtures of corn and soy produced elsewhere.

Technical Specifications

- Composition of CSB is shown in Table III. These figures are for planning purposes and do not necessarily reflect the exact specifications of the USDA Export Purchase Announcements for the P.L. 480 program which change periodically.
- Contains: 69.5% cornmeal (processed gelatinized), 21.8% soy flour (defatted, toasted), 5.5% soybean oil (refined, deodorized, stabilized), 3% minerals and vitamin antioxidant premix).
- Mineral premix contains tricalcium phosphate, ferrous sulphate, zinc sulphate and iodized salt. Vitamin mix contains vitamin A palmitate, vitamin D alpha-tocopherol acetate, thiamin mononitrate, ascorbic acid, pyridoxine hydrochloride, niacin, D panthothenate, folic acid and vitamin B12 in a soy flour carrier.

Application

- Used in selective feeding programs and MCH programs as a wet or dry ration.
- Used in general distribution to provide suitable foods for children.
- Used as a vehicle for micronutrient delivery in cereal based diets.

ADVANTAGES	DISADVANTAGES	CAUTIONS
▪ Suitable for children over 6 months ▪ Fortified with vitamins and minerals ▪ Easily digestible ▪ Cheaper than compact foods ▪ Culturally acceptable for most populations	▪ Bulky and harder to distribute than compact foods ▪ Requires resources for cooking and eating ▪ When mixed and cooked with water must be eaten within 3 hours	▪ Not intended to be used a sole food

QUICK REFERENCE TECHNICAL CARD

Product Name: **HUMANITARIAN DAILY RATIONS (HDRs)**
Manufactured by: US Department of Defense
Short Description: Ready to eat compact ration (2000kcal/ration)
Cost US$ MT/2100: 2,194/3.95

General Description

Designed to meet the nutritional needs of civilians in a humanitarian crisis. Each ration contains 1900-2000kcal/one day ration for an adult. Ration contents may vary, but contain one or more of certain listed items. Within each box of 10 HDRs there is a variety of three types of meal formats. Food items contained in individual vacuum-sealed packets. Tea and soup items in paper sachets. Items packed in a small cardboard unit of 1.8kg. Ten HDRs are packed in one carton of 11.8 kg. Shelf life is 2-5 years.

Technical Specifications

- HDRS contain no animal products.
- Example of a meal format: lentil stew, corn chowder, saltine biscuit crackers, bread, gelatin fruit chews, grape jelly and granola mix.
- HDRS contain 25-37g fat, 40-60g protein and 324-434g carbohydrate.

Application

- During the first phase of a relief operation, before food basket is established (within 24-72 hours).
- During repatriation operations.

ADVANTAGES	DISADVANTAGES	CAUTIONS
▪ Most products can be eaten directly from the packet ▪ Provides dietary variety ▪ Airdrop survivability	▪ Hard to open without a knife or scissors ▪ Many items not suitable for children 6-12 months ▪ Unfamiliar to many emergency affected populations leading to wastage and insufficient nutrient intake ▪ Difficult to dispose of outer wrappings	▪ Not suitable for children < 12 months ▪ Use with caution

QUICK REFERENCE TECHNICAL CARD

Product Name: **HIGH ENERGY BISCUITS (HEBs)**
Manufactured by: WFP (Bisca, Denmark; House of Manji, Nairobi)*
Short Description: High energy biscuits for use in emergencies
Cost US$ MT/2100: 1200/55c

General Description

Biscuits/cookies for use in emergencies. Configuration and packaging varies. Can be packed in cylindrical or square wrapping. Often packed in 10kg cartons or metal tins. Packing in metal tins extends shelf life from 18 months to five years. May be foil wrapped in packs of 200-250g in cardboard boxes with a shelf life of 1-2 years. A weighted plastic packaging known as the "snowdrop" allows HEBs to be dropped from high altitudes in insecure areas where low level flying and regular airdrops are not possible. As a rule of thumb two HEBs are equivalent in energy density to one BP5 bar.

Technical Specifications

- Biscuits made for WFP must meet minimum specifications, 450 kcal/100g, 12g protein and fortified with micronutrients (50-75% of adult daily requirements).
- Packaging of biscuits must ensure a moisture-proof and light-proof and airtight packing to avoid rancidity.
- HEBs do not meet all the recommended standards for macro and micronutrient content but is in the process of being adjusted. Certain nutrients may be destroyed in the baking process (lysine, Vitamin C). Current specs are for the finished product.

Application

- During the first phase of a relief operation to the whole population before a food basket has been established if available on a timely basis (24-72 hours).
- During repatriation operations
- Targeted vulnerable groups such as children and pregnant and lactating women
- Selective feeding programs on site or as take home rations (particularly used to encourage appetite and as snacks).

ADVANTAGES	DISADVANTAGES	CAUTIONS
▪ Widely recognized and culturally appropriate ▪ More popular than BP5 in general feeding ▪ Cheaper than compact foods ▪ Needs no preparation ▪ Can be crumbled to porridge ▪ Less prone to diversion than compact foods ▪ Packaging appropriate to situation	▪ Need to eat a lot of biscuits to meet energy requirements for an adult ▪ May be sold by recipients ▪ Can become easily spoiled if not packed in the right way leading to wastage	

*HEBs are manufactured for WFP. The product manufactured by BISCA, Denmark is currently considered the most popular. Fambix is made by the House of Manji and widely used in East Africa. All HEBs manufactured for WFP must meet the minimum specs (see table). UNICEF distributes HEBS made by various manufacturers (Marie biscuits). Jamin B and Jamin D manufactured in Norway, are used by European NGOs. All HEBs have similar nutritional composition. HEB previously manufactured by OXFAM UK had the highest energy density 125/100kcal.

QUICK REFERENCE TECHNICAL CARD

Product Name: **NUTRIFIL**
Manufactured by: Nutrifil, Ireland
Short Description: Ready to eat nutritionally complete supplementary food
Cost US$ MT/2100: 2045 (subject to Irish Punts exchange rate)/0.96

General Description

Nutritionally complete supplementary food. Designed for use in selective feeding programs in emergencies (supplementary feeding and phase two therapeutic feeding). Can also be used as a short-term survival ration. Packed in 25 kg bags. One 25 kg bag mixed with 100 liters of water provided 50 persons with 2000kcal/day. Minimum shelf life of 24 months.

Technical Specifications

- Designed to achieve catch up growth and contains essential minerals that need to be replaced following weight loss (Potassium, Zinc, Magnesium and Copper).
- Contains baked wheat flour, fat filled milk powder, sucrose, vitamin and mineral premix. Contains no flavors, colors or animal fats.
- Feeding trials have shown Nutrifil to be effective in supporting weight gain and growth, stimulating the immune system.
- High carbohydrate (62%), fat (23%) and 70% protein from milk.
- 240g of Nutrifil (1000 kcal) provides the recommended intakes for essential nutrients.
- Manufactured to HACCP standard and conforms to EU microbiological safety guidelines.
- Nutrifil uses a computerized dietary analysis package (PCDIET) to analyze nutritional components of diets for population groups or individuals.

Application

- May be used as a short-term survival ration for populations under nutritional stress in on-site feeding or take home programs.
- Used in the rehabilitation phase during the treatment of severe malnutrition for children >6 months.
- Used in institutional or community feeding programs of adults and children under nutritional stress.
- Used for feeding of people living with HIV/AIDS.
- Can be used as a drink, porridge or added to other foods to enhance nutritional value.

ADVANTAGES	DISADVANTAGES	CAUTIONS
▪ Complete food, good for onsite feeding or take home supplementary food ▪ Requires NO cooking unlike CSB and WSB ▪ Culturally acceptable ▪ Not prone to diversion	▪ Needs water to mix ▪ Higher weight to volume ratio than BP5 ▪ More difficult to distribute than compact foods/biscuits	▪ Must be consumed within 3 hours once mixed ▪ Not to be used in phase 1 of therapeutic feeding programs since it contains iron ▪ Not to be used as a breastmilk substitute or for tube feeding

QUICK REFERENCE TECHNICAL CARD

Product Name: **PLUMPY FOOD***
Manufactured by: Nutriset, France
Short Description: Ready to eat nutritional supplement
Cost US$ MT/2100: Approx. $3,200 (subject to exchange rate FF)/1.28

General Description

Ready to eat food for use in emergencies. Chocolate flavored paste. Available in individual foil wrapped sachets of 92 g. 150 sachets packed in a carton weighing 13.8 kg (net). Shelf life of 12 months. Needs to be kept in a cool dry place.

Technical Specifications

- Contains vegetable fat, dry skimmed milk, sugar, lactoserum, peanut butter, cocoa powder, vitamin and mineral mix.
- Meets macro and micronutrient requirements.
- Contains peanut butter and milk products.
- Not suitable for children under 12 months.
- Water needs to be provided with Plumpy Food since it is thirst provoking.
- Can be adapted at source to meet specific needs.
- Labeled in blue to distinguish it from Plumpy nut (see footnote).

Application

Used in the first phase of a relief operation. Particularly suitable as a complement to a bread-based ration. Could also be used to spread on biscuits or crackers.

ADVANTAGES	DISADVANTAGES	CAUTIONS
▪ Ready to eat supplement. Ideal for bread-based rations ▪ High energy and nutrient density in 500 kcal sachet ▪ Good weight/volume ratio ▪ Stocks always available and delivered quickly	▪ Short shelf life ▪ Contains peanut butter ▪ Not generic enough for wide-scale use ▪ Not suitable for children 6-12 months	▪ Not suitable for children under 12 months ▪ Not to be used in phase 1 of therapeutic feeding programs since it contains iron ▪ Should not be used a sole food for general distribution

*Plumpy nut is also manufactured by Nutriset and is designed for severely malnourished children and adults during the rehabilitation phase and for moderately malnourished children and adults. Its nutritional value is similar to BP100. It is packed in the same way as Plumpy food (92g sachet/500kcal) but is labeled in RED. It contains peanuts. Plumpy sauce is designed to supplement a cereal-based diet. It contains missing nutrients and energy. It may be adapted to specific situations.

ANNEX 5

KEY CONTACTS

KEY CONTACTS

NAME	ORGANIZATION / AFFILIATION
ANNA TAYLOR	SAVE THE CHILDREN, UK
JOHN SEAMAN	SAVE THE CHILDREN, UK
LOLA GOSTELOW	SAVE THE CHILDREN, UK
STEVE HANSCH	FRED CUNY CENTER
ANNE CANALLAN	WORLD FOOD PROGRAM
ZARA MIRGHANI	UNHCR
GUILLAUME LEGALLAIS	MSF, FRANCE
ARIANNE CURDY	ICRC
JINDRA CEKRA	AMERICAN RED CROSS
HISHAM KHOGALI	OXFAM UK
HELEN YOUNG	ODI, UK/TUFTS UNIVERSITY
SUZANNE JASPARS	OXFAM UK
ELANOR BEDFORD	US COMMITTEE FOR REFUGEES
JEREMY SHOHAM	EMERGENCY NUTRITION NETWORK
BARBARA REED	FANTA CONSULTANT
MARY LUNG'AHO	LINKAGES /AED
VICTOR TANNER	CONSULTANT/OFDA
CHARLES KELLY	CONSULTANT
JOHN FAWCETT	CONSULTANT
MAJOR MARIA BOVILL	US ARMY
MAJOR PAUL WILLIS	UK ARMY
KRISHNA BELBASE	UNICEF
MARJETTA TOLVANEN	UNICEF
IAIN LEVINE	UNICEF
SUSAN BRADLEY	USAID, FOOD FOR PEACE
ANNE RALTE	FANTA CONSULTANT
MARY MERTENS	USAID, FOOD FOR PEACE
PETER MORRIS	USAID, OFDA
DAVE HAGEN	USAID, FOOD FOR PEACE
SAM KAHN	USAID/G/PHN
TOM MARCHIONE	USAID/PPM
LARRY MESERVE	USAID/OFDA
ELISABETH KVITSHAVILI	USAID/OFDA
GEORGE BEATON	GHB CONSULTING
MICHAEL GOLDEN	UNIVERSITY OF ABERDEEN
TOM ROLL	COMPACT NORWAY
THERESE LESANE	NUTISET, FRANCE